

The Information Behaviour of Mature Online Doctoral Students at a University in the United Kingdom: A Qualitative Exploratory Case Study

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Abstract

Online doctoral students' information behaviour is drawn from their experiences in the information behaviour process cycle, learning at the doctoral level and usability of information support services. It emphasises the behaviour of humans and their interaction with information, rather than the information system itself. This doctoral thesis focuses on the perceptions and experiences of the online doctoral students, as highly non-traditional adult learners, at two phases of the thesis stage: the pre-ethical and post-ethical approval phase. Wilson's 1997 information behaviour conceptual framework is used to design this study, which identifies four main components of information behaviour: person-in-context, information-need, information-seeking, and information-processing-and-use. The research employs a qualitative single-case study design, in which 19 participants, 14 students and 5 faculty members were interviewed. The results showed there is a significant level of 'socialness' in the online doctoral students' information behaviour through the information-sharing activities. As they undergo the information behaviour iterative process cycle, a transformation occurs. They acquire knowledge and skills that change their mental and emotional structures. Doctoral-level learning is transformative, wherein students experience an ontological, epistemological and methodological shift in 'self' ($S \rightarrow S'$). These findings help expand Wilson's information behaviour conceptual framework by adding information-sharing as a new component. The study also found that the information behaviour process is not a linear sequential process but is one that is iterative, until a specific outcome is achieved. In addition, the study discovers Wilson's intervening variables: social learning and self-efficacy theories are appropriate attributes of the person-in-context, rather than influencing variables in information-seeking. The outcome of information use through the person-in-context attributes changes knowledge, skills, and the mental and emotional structure of 'self' (S), making $S = KNL$ (*knowledge*) + SKL (*skill*) + MTL (*mental*) + EMT (*emotion*). Further, the findings showed that information support services hold a significant influence on the students' information behaviour in terms of user experience in the information and learning support environment, where socialness in the online information for adult learners, the adoption of usability and user experience concepts should be enhanced.

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Chapter 1 : Introduction

Studies on information behaviour illustrate numerous activities associated with information-need, information-seeking, and information-processing-and-use. Initially, information behaviour research focused on library and information science discipline to identify areas of improvements in library services (Vezzosi, 2009; Wilson, 2008). However, the direction of the research has now shifted towards information users, and seeks to understand the users' behaviour when interacting with information and the information environment within their context. This study explores the information behaviour of mature online doctoral students at a university in the United Kingdom. The students are working professionals from around the world who are pursuing a professional doctorate.

1.1. Research motivation

Information behaviour has been studied extensively among undergraduate and postgraduate students (Case, 2012). However, no previous studies have been conducted on online doctoral students who are mature working professionals from around the world. Such a context is unique and warrants further investigation as the world of academia reaches out to different corners of the world through online learning. The percentage of enrolment among students studying remotely has increased worldwide (Tury et al., 2015). Yet, little is known about their information behaviour patterns or the nature of learning as a result of information use. The enrolment of mature students in higher education has increased, and through online education, these students have the opportunity to access quality education from well-established higher education institutions (HEIs). The increasing presence of these mature students in HEIs also impacts the business and economy of the education industry, making it a fertile field of study in information and education (Butcher, 2020; A. Kumar et al., 2017; U.S. Department of Labor, 2007). The mature online doctoral students are a unique subject of investigation amidst the rapid growth of online education, and merit study. Hence, this study seeks to explore, discover and contribute new knowledge in the study of information behaviour among mature online doctoral students.

1.2. Aims of the study

This study aims to explore the information behaviour of mature doctoral students in an online learning environment. The degree is a professional doctorate offered by a university in the United Kingdom to mature working professionals from around the world. The attributes of the mature working professionals as online doctoral students present a unique context for this study because of the students' extensive work and life experiences. The nature of the professional doctorate also presents an opportunity to explore the information behaviour patterns of the students' knowledge, skills, application and experiences (Fink, 2006) that contribute to practical scholarly research work. In addition, human information behaviour is complex. It involves cognitive, affective and social factors that impact behaviour and actions (Blummer & Kenton, 2014). Understanding the information behaviour of mature online doctoral students may assist information support personnel (supervisors, faculty members, librarians, and administrators) in offering the most suitable and required instructions and services. All such factors make the present study unique, firstly because no known previous studies have been conducted, to the best of the author's knowledge, and, secondly because of the backgrounds of the learners, the learning environment and the type of doctorate in the context of the study.

Hence, this study will explore the type of information needed by the students, the purpose for needing the information, and it will identify the sources and resources used by the students through information behaviour activities and decision-making patterns. The focus of the students' information behaviour lies in their information use. The goal is to identify areas that influence the students' learning and personal growth and the impact the information support services environment has on information behaviour. Based on all the above factors, three research questions emerged:

- RQ1: How do doctoral students understand and interpret their information behaviour in an online learning environment?
- RQ2: How does doctoral students' information behaviour influence learning in an online learning environment?

RQ3: How do information support services influence doctoral students' information behaviour and learning experiences?

1.3. Terminologies and definitions

This study explores how mature students need, seek, process, use and share information in an online learning environment, and how these activities influence their learning at the doctoral level. It also investigates how the information support services provided by the university impact the students' information behaviour and their learning experiences. The followings are the terminologies and definitions adopted by the present study.

1.3.1. Information behaviour

The concept of information behaviour emphasises on the human behaviour associated to the sources and channels of information (Koh et al., 2015). In this study, it refers to how the students need, seek, process, select, use, create and share information to fulfil specific research and learning goals. It includes the interaction between people and information through the ICT platform or through human-to-human interaction (Al-Muomen et al., 2012; Aydin, 2017; Koh et al., 2015) where the students' emotions trigger patterns of facial and bodily changes, cognitive appraisals and subjective feelings. Ultimately, their actions influence their behaviour where learning and change lead to successful decision making (Wade & Tayris, 2010, as cited in Davies & Williams, 2013).

1.3.2. Information need

Information need occurs when students identified gaps in their knowledge or skills which then trigger the information-seeking action to close the gaps (Ingwersen & Järvelin, 2005). The students fundamentally need the information to fulfil their research and learning goals that lead to the completion of the thesis and the doctoral programme. Their information need is progressive in nature, depending on the phases of their study (Chu & Law, 2008).

1.3.3. Information seeking

Information seeking is activities the students engage in when a need for information is identified. It involves searching for the information through various sources and resources (Wilson, 1999a). The students' information-seeking behaviour is purposive as a consequence of the need to satisfy their research and learning goals (Wilson, 2000a). As students progress in their information-seeking activities, their existing knowledge changes in the process, when the information sought is used successfully (Ahiauzu & Ani, 2015).

1.3.4. Information processing and use

Information processing involves the selection and filtering of information to answer questions, solve problems, make decisions, negotiate a position, or make sense of a situation (Choo et al., 2006; Jia et al., 2013; Kari, 2010). If the information is deemed relevant (decision-making) to the students' research and learning goals, the information is then used to satisfy their information needs.

1.3.5. Information sharing

Information sharing is when students provide or receive information that is useful or relevant to their learning and research. Students seek or obtain information from others, not only from information systems (Wilson, 1981, 2000b).

1.3.6. Mature students

Mature students in the present study are those who fit the profile of the highly non-traditional adult learners who study part-time, are financially independent, work full-time, and has dependent or are single parents (U.S. Department of Labor, 2007). Wilson (1997), Heinstrom (2002) and Miller (2002) posit that the internal and external attributes of people affect their attitudes, feelings, beliefs, interests, and expressions, which are often reflected in a person's intellect, understanding, thoughts, ideas and emotions (Bates, 2006, 2010).

1.3.7. Information support services

The information support services are formal services provided by the university that focuses on providing relevant information to support students' needs throughout their doctoral journey. They consist of support from online (information systems) and human sources (supervisors, faculty members, support personnel, professionals and students) and resources (online and offline). The availability and effectiveness of the information sources and resources (information support services) shape students' information behaviour and learning (Karunakaran et al., 2013).

1.4. Structure of the thesis

This thesis consists of six chapters:

1. Introduction
2. Literature Review
3. Methodology
4. Findings
5. Discussion
6. Conclusion

The remaining chapters are summarised as below.

Chapter 2 discusses and reviews existing literature on information behaviour. The chapter is divided into five parts. The first part reviewed ten existing information behaviour conceptual frameworks in which elements of human nature (the information user) were the centre of attention. After extensive review, Wilson's (1997) information behaviour conceptual framework was selected to guide this study, as it focuses on the information user (person-in-context) and the theories that influence the behaviour of a person while interacting with information. The second part identifies important elements that support and complete the information behaviour pattern. It defines and discusses theories and activities surrounding information, information needs, information seeking, information processing and use, and information sharing. The third part focuses on doctoral students as learners, their learning environment, and their nature of learning. The fourth part discusses areas in the role

of information and communication technology (ICT) in providing a conducive online learning environment, as supported by the information support services. Finally, the last part identifies the gaps that act as the basis for the research design, specifying the components and scope related to information behaviour, doctoral learning, the online learning environment, and information support services.

Chapter 3 gives a detailed explanation of the methodology for this study. It shows how the study adopts inductive reasoning and interpretivism as its ontological and epistemological stance. The present study adopts a qualitative single case study methodology where semi-structured interviews were carried out on a group of students through purposive sampling. Data was analysed using the thematic analysis method following Yin's (2016) five phases of analysis and Saldana's (2013) first and second cycle coding.

Chapter 4 presents the findings and highlights quotes from the research participants. Findings revealed three major themes and ten sub-themes. The chapter starts by introducing the students' background that classified them as highly non-traditional adult learners or mature learners. The first major theme emphasises that the doctoral students' information behaviour is not linear but goes through an iterative process cycle until all their research and learning goals are met. The second major theme provides an overview of the students as doctoral learners, their learning style, and the outcome of their doctoral learning. Finally, the third major theme discusses the students' experiences with the information support services provided by the university.

Chapter 5 discusses the doctoral students' information behaviour, doctoral learning and information support services with key findings that lead to the development of the new information behaviour conceptual framework as a contribution to new knowledge. The chapter focuses on the fact that the doctoral students' information behaviour iterative process cycle promoted transformative learning that led to the change in 'self'. It also reveals that the nature of doctoral education promoted socialness in students' information behaviour and learning. The chapter ends with practical recommendations.

Chapter 6 is the conclusion of this study. It identifies the limitations and explores opportunities for future research. The chapter closes with an autobiographical reflection that explains how the doctoral learning and journey influenced the positioning of the researcher.

Chapter 2 : Literature Review

This study explores the information behaviour of students who pursue a professional doctorate at a university in the United Kingdom. It examines how the information behaviour of doctoral students is influenced by factors such as the information process cycle and the information environment, doctoral learning, the online learning environment and information support services. In the past, studies exploring information behaviour tended to focus on the electronic information environment and library information science using the quantitative methodology (Ahiauzu & Ani, 2015; Ajiboye & Tella, 2007; Chaura, 2015; Eynon & Malmberg, 2012; Hoppenfeld & Smith, 2014; Niu & Hemminger, 2012; Ocheibi & Buba, 2003; Oladokun, 2010; Stokes & Urquhart, 2011, 2015; Tury, 2014; Vilar et al., 2015). The trend, however, has shifted the focus from system-centred to human-centred, where interests are converged on information users' behaviour surrounding information and its environment. This research aims at asking the 'how' and 'why' rather than the 'what' of information behaviour. It is believed that, by first understanding the information users and their behaviour, all other elements surrounding them and their interaction with information could be planned, designed, developed and improved. This study holds a strong belief that the behaviour of information users is crucial in shaping the information environment, learning programme delivery and information support services.

Prior to conducting the literature review, all that was known was that the research participants are mature students who are pursuing a professional doctoral degree in an online learning environment. Throughout their learning journey, they are supported by the information support services provided by the university. Based on the context above, a series of questions was asked to guide the literature search. Figure 2.1 provides an overview of the preliminary questions that initiated the literature search. However, the questions do not limit the scope of the search and discussions. As more information was gathered, new questions emerged, allowing further exploration and consideration.

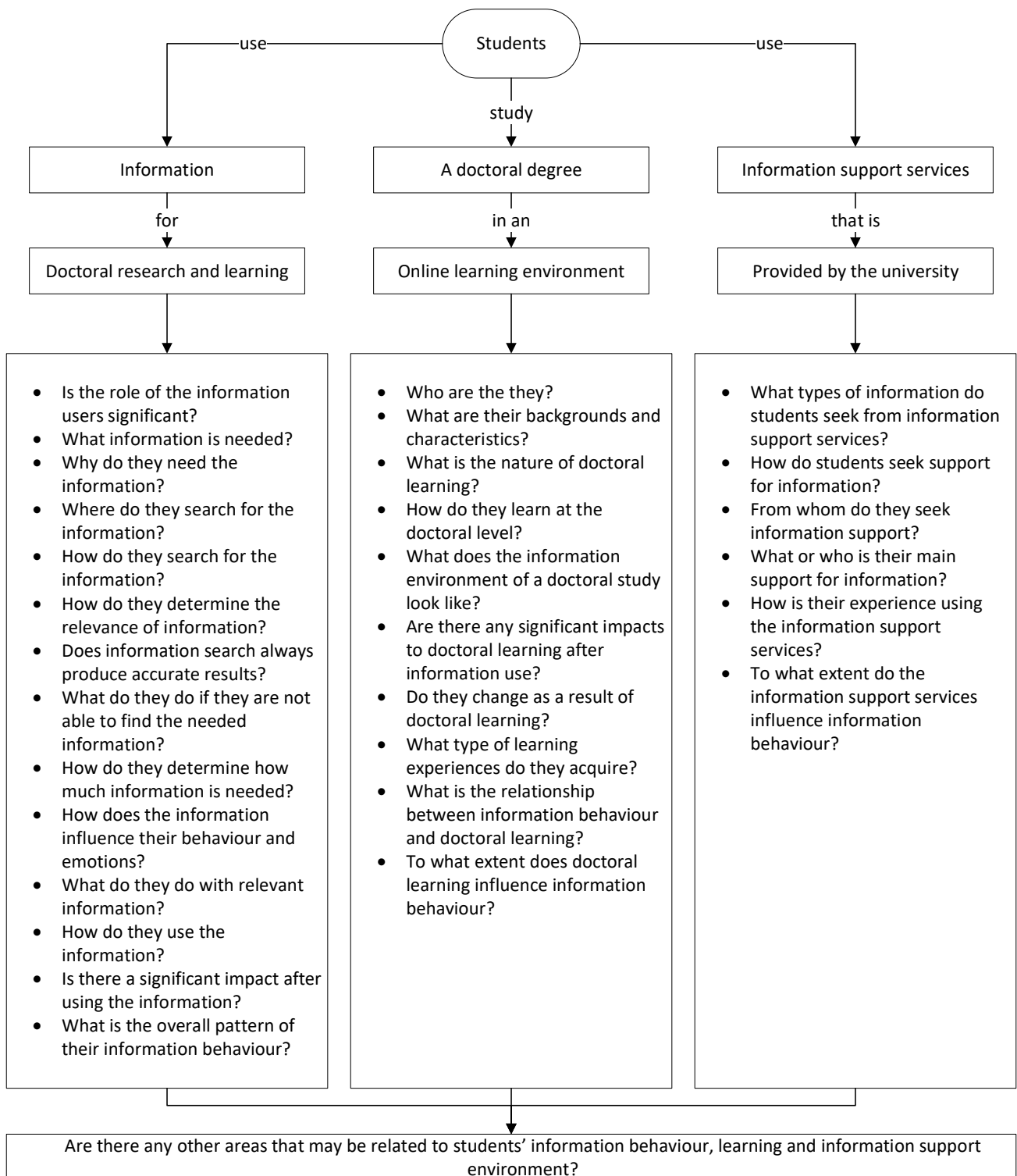


Figure 2.1: Preliminary questions that guided the review of literature

The literature review starts by providing a clear definition of the word ‘information’, as it is an important element in the students’ research and learning. From there, the review offers a discussion of the process of selecting an information behaviour conceptual framework to guide this study. The discussion on information behaviour is then compartmentalised by discussing the main components,

such as the person-in-context, information needs, information seeking, information processing and use, and information sharing. The discussion of each component details students' behaviour patterns, decision-making, actions and reactions surrounding information and its environment. The discussion then explores the factors that influence doctoral students' information behaviour, particularly surrounding their learning and information environment. Finally, the chapter offers a discussion of the role of the information support environment and its influence on students' information behaviour. In conclusion, the chapter summarises the areas to be studied that establish the scope of the research and inform this study's research design.

2.1. The definition of information

Doctoral students interact with information all the time, from simple to more complex forms. In studies of information behaviour, the word 'information' represents data, facts, intelligence or knowledge (Bouthillier & Shearer, 2003). Heinstrom (2002) and Miller (2002) emphasise that information in itself has no meaning until it is received, interpreted and understood by a user – a process essential for doctoral education. Information is defined as a cognitive level that is tacit and resides within the individual, thus making it unique (Heinstrom, 2002; Miller, 2002). This uniqueness is shaped by the individual's interests, beliefs, attitudes, motivations, feelings and a sense of relevance, making it personal and dynamic (Miller, 2002). Since this is an information-rich world, information influences humans' intellect, emotions, understandings, thoughts and ideas, either positively or negatively (Bates, 2006, 2010).

Generally, information tends to promote learning. Learning changes perspectives and conceptions and is often replaced with novel concepts and ideas at a continuous pace. When information is embedded within one's intellect, it is not easily forgotten; instead, the inner structure of the individual changes (Heinstrom, 2002) as that individual interacts with information. The change was demonstrated by Heinstrom's (2002) study on master's students that revealed the students' personality affects the way in which they interact with information. For example, an impulsive or easy-going student is more likely to be spontaneous and less structured while gathering information, compared to a search done by a conscientious and methodical person. Heinstrom (2002) also claims that the higher the involvement and interest of the students, the more complex and profound the

need for information tends to be. Through Heinström's (2002) claim, the present study implies that the search systems and information support services must be developed to better account for individual differences. Experts' views of information differ. Some claim that information is a tool designed for making sense of reality and acts as a bridge that closes the gap between problems and solutions. Others regard information as a troublesome concept and claim that the challenge is not the lack of a definition but the failure to use the definition appropriately to suit the purpose of an investigation (Wilson, 2006a).

Based on the diverse views discussed, the present research interprets information as any form of factual data derived from facts, advice or opinion that is transferred physically, electronically, or orally from one source to another (communication channels), sufficiently and efficiently (Wilson, 2006a). When people function as the source of information, Heinström (2002) and Miller (2002) posit that a successful transfer of information involves knowing and caring about the intended recipient well enough to anticipate how they interpret and use the information. The process reflects trust within a learning environment that is highly critical, rigorous, challenging and personal, yet social. The definition of information in the context of this study means that information is intended to serve the doctoral students' learning process so that they can complete their doctoral research and thesis.

2.2. Understanding information behaviour

When the concept of information behaviour was first introduced, its purpose was to investigate and improve the library system and services (Bates, 2006, 2010; Wilson, 1997, 2000a). In recent years, the focus of the study shifted from system-centred to human-centred, wherein information users became the main point of research. Before the study of information behaviour was focused on information systems, their functions and features (system-centred). However, as the research evolved, the study shifted from information system to the recipients or users of information (human-centred) through online or offline sources and resources. It is believed that studying information users would lead to an understanding of the what, how and why of information behaviour, hence revealing the effectiveness of the information sources and the information environment as a whole (Rubinić, 2014; Wilson, 2008). To date, the Internet plays a big part in delivering education at a global

level. As universities began to offer online education, the shift towards such an eco-system opens new opportunities by which to explore the study of information behaviour further.

With the advancement in ICT, users can access information in multiple ways and from multiple sources, making content search an endless possibility, hence giving rise to emotional uncertainties as information seekers shift through a massive volume of information. Wilson (1997) recognises the need and believes the integrative framework of information behaviour should be person-centred rather than system-centred, which is in line with Dervin's sense-making approach that seeks to understand information users amidst diversity and complexity (Dervin, 1998). Studies of information users revolve around what information is needed, how they seek information, how they process and use information, what triggers their decision-making, and how they react when interacting with information. Therefore, Wilson (1997) highlights that there is a need to consider the design of the sources and information environment that influence users' information behaviour. To do that, Wilson (1997) introduced a generic information behaviour conceptual framework that puts the information user (person-in-context) as the main component of the information behaviour process cycle. The particular framework has been widely accepted and tested by many researchers from around the world, owing to its flexibility and use of theories that involve human behaviour. Figure 2.2 shows Wilson's (1997) information behaviour conceptual framework, better known as Wilson's (1997) general conceptual framework.

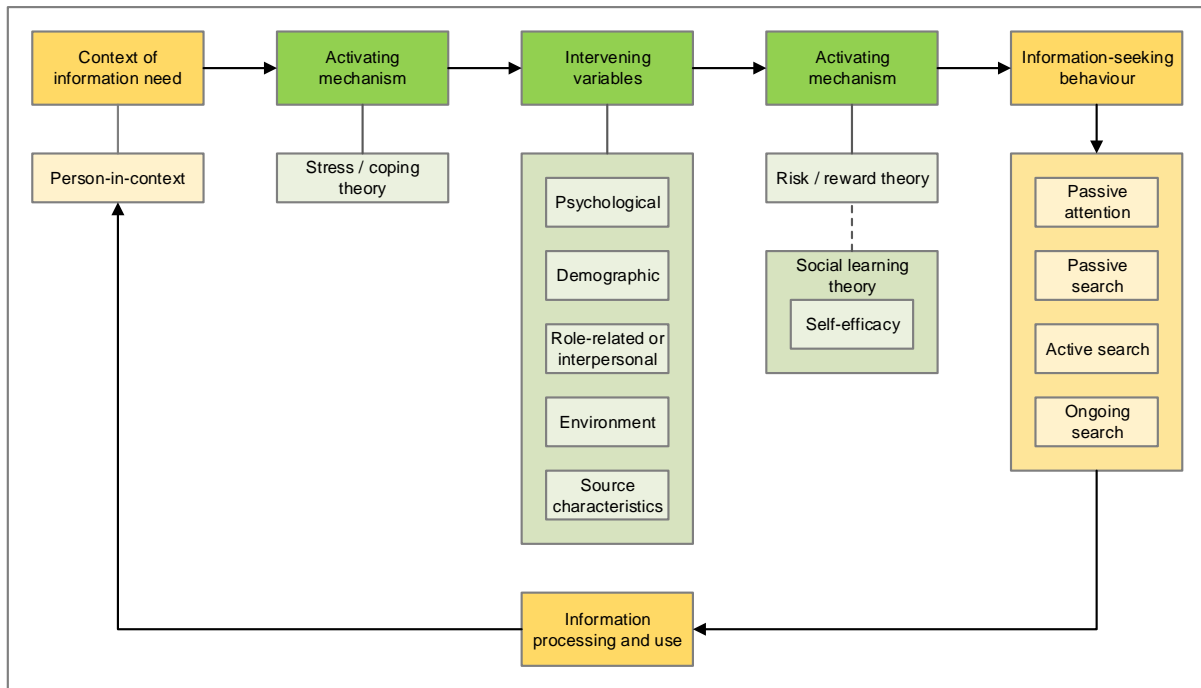


Figure 2.2: Wilson's (1997) information behaviour conceptual framework

Information behaviour focuses on the overall human behaviour related to the sources and channels of information (Koh et al., 2015). It describes how people need, seek, process, select, use, create and share information continuously to satisfy specific goals within a related context (Koh et al., 2015). It includes the interaction between people and information through the ICT platform or human-to-human interaction (Al-Muomen et al., 2012; Aydin, 2017; Koh et al., 2015). Information behaviour does not just describe the activity of seeking information but encompasses a hierarchy of behaviour and sub-behaviours. The individual's emotion plays a crucial role in triggering patterns of facial and bodily changes, cognitive appraisals and subjective feelings, but tendencies towards an action potentially influence the individual's behaviour where learning and change lead to successful decision making (Wade & Tayris, 2010, as cited in Davies & Williams, 2013). The discussion above provides an opportunity for this study to verify whether the components and processes of the information behaviour of the doctoral students are similar to that which was claimed by others. As learning at the doctoral level involves extensive information search, use, discernment and decision-making, major questions explored herein include how far will all the information behaviour activities be carried out to fulfil the research and learning goals, and to what extent will the students' cognitive processing and emotional impact be demonstrated.

According to Meyer (2016), information behaviour is primarily a mental process having a complicated relationship with core components and attributes of information users, which is in line with Wilson's (1997) originally proposed conceptual framework, as shown in Figure 2.2, above. The behaviour of the users of the information is influenced by attributes called the activating mechanism and intervening variables. However, the author emphasises that information user's behaviour, cognitive activities and affective states may change while interacting with sources of information. The complexity of doctoral study means that students will require a huge amount of information to support research work that contributes to new knowledge. Although the idea of contributing to new knowledge is something that cannot be predicted but is revealed through students' research data and findings, the present study argues that students' interactions with information will display extensive cognitive processing that will affect their emotions surrounding learning. The questions are, what type of cognitive processing is involved, and how far will students' emotions impact their learning and self-development. Also, users' experience with information is situational, and Koh et al. (2015) argue that the environmental consequences should be taken into account, which, in this case, involve the information support services and information systems.

In the current era of the online or digital environment, the concept of context in information behaviour becomes relevant owing to the psychological and social impact, which adds to the complexity of human-information interaction in the real world, especially in cultural or socio-political terms (Meyer, 2016; Wilson, 1981). To date, the information behaviour identified and discussed in the literature is the information need, information seeking, information processing, information use, information sharing, and information sources. The uniqueness of the combination of these components has increased the current interest of the research to include study of the effect of information behaviour in various fields. The contribution is worth noting towards influencing information system development and provision, information support services, information policy, information literacy, and information strategy. While the contributions to the abovementioned areas are crucial and are part of the doctoral information and learning environment, the present study will focus on areas of information support services, and the information and learning environment. However, the present study will still be open to what the data will reveal, and will explore other areas if substantial evidence is garnered.

Over the years, researchers have designed information behaviour frameworks that either emphasise the overall process or the interactive environment. The conceptual frameworks do not emphasise the components that incorporate human characteristics and theories that reflect information users' interaction with information. If ever the human attributes are to be considered crucial in the study of information behaviour and the development of information support services, then Wilson's (1997) information behaviour conceptual framework presents all that is needed to shape the path of the present study. Wilson's (1997) inclusion of human attributes and theories, and the process of information behaviour, has surpassed the conceptual frameworks developed by other researchers.

Wilson's (1997) framework was selected out of extensive analysis and comparison with nine other information behaviour conceptual frameworks, or frameworks introduced by Wilson and others (Dervin, 1998; Ellis, 1989; Ellis et al., 1993; Fisher et al., 2005; Godbold, 2006; Kuhlthau, 1991; Niedźwiedzka, 2003; Wilson, 1981, 1997, 1999b) – please refer to Appendix G. Wilson's (1997) framework is deemed suitable for the present study, due to its flexibility in applying the framework in any context, making it robust in the application and is practical for further exploration. Tom Wilson has pioneered research in information behaviour and information science for many years. His knowledge and experience in this area have garnered respect, and many researchers from around the world have referenced his work to guide their information behaviour study. The framework developed by Wilson (1997), as shown in Figure 2.2, was a result of extensive empirical study and evolution from his past conceptual frameworks (Wilson, 1997, 1999a, 2000a). The other nine frameworks that were reviewed were not selected because of one of the following reasons: 1) the framework was developed as a result of reviewing literature and not supported by extensive empirical data, 2) the framework only indicates information behaviour components and processes and does not specify human-related theories that influence information behaviour, and 3) the development of the framework referenced Wilson's various frameworks and studies.

The main reason Wilson's (1997) framework was selected for this study is because of its simplicity in specifying the process flow of information behaviour. The process indicates key components of information behaviour while linking them to human-related theories that influence information behaviour. The simplicity and coverage of information behaviour activities in the framework guide this research by 1) emphasising the information user (person-in-context) as the main influencing factor of information behaviour (specified by the intervening variables in the framework), 2) allowing

for the identification of key information behaviour components that define the process and scope of students' information behaviour, and 3) introducing key theories (specified by activating mechanisms in the framework) that are related to the person-in-context and how the use of these theories allow for further exploration on other inter-related theories. The fact of the matter is that human behaviour is complex. The huge volume of information needed to support students' doctoral learning can complicate the identification of activities and theories surrounding human information behaviour. The use of Wilson's (1997) framework will help this study find a starting point and identify the boundary and scope for this research, eliminating all complexities surrounding human behaviour, particularly human information behaviour.

In the intervening variables component (refer to Figure 2.2), Wilson (1997) argues that the attributes concerning the person-in-context play a role in influencing information-seeking behaviour. He also argues that, when information users need and seek information, their activities and behaviour are linked to stress/coping (Folkman, 1984), risk/reward (Settle & Alreck, 1989), social learning (Bandura, 1977a) and self-efficacy (Bandura, 1977b), all of which he calls activating mechanisms. The use of the intervening variables and activating mechanisms indicates that the person-in-context is the main influencing factor shaping information behaviour, apart from the information services and environment. Wilson's (1997) emphasis on the role of the person-in-context supports the aim of the present research, which is to focus on the behaviour patterns of information users, rather than on information systems (information environment). Section 2.2.1 details and rationalises the use of the intervening variables and activating mechanism. It also questions whether the theories specified in the framework are sufficient and would accurately reflect the research participants and the context of the present study. While the framework sets the starting point and scope of the information behaviour discussions, other theories are considered and discussed to fit the context of the study. The following sub-sections detail each component of information behaviour as specified by Wilson's (1997) conceptual framework.

2.2.1. The doctoral students as information users (person-in-context)

For the information behaviour framework to be effective and user-centred, Wilson (1997) argues that there is a need to emphasise the person-in-context (the information user) which influences information behaviour. The importance of the information user (the central force) was also

highlighted in Wilson's (1981) information behaviour conceptual framework, which positions the information user at the centre of the information behaviour process, Kuhlthau's (2004) information search process that considers the feelings, thoughts and actions of information seekers, and Dervin's (1998) sense-making theory that rationalises human sense-making and sense-unmaking within the time-space boundary.

As specified in Wilson's (1997) framework, the person-in-context influences the decision to seek information by identifying a gap between a situation and information use. Wilson (1997) proposes the activating mechanism and intervening variables to fill the gap, positioning them between information-needs and information-seeking (see Figure 2.2). In his framework, Wilson (1997) proposes that the stress/coping (Folkman, 1984) theory, risk/reward theory (Settle & Alreck, 1989), social learning theory (Bandura, 1977a) and self-efficacy theory (Bandura, 1977b) influence information-seeking activities.

Information users need information to fulfil existing gaps or specific goals. The situation of needing information to close existing gaps and achieve specific goals presents different levels of importance and criticality. In such a situation, Wilson (1997) proposes that the stress/coping theory influences the extensiveness of information-seeking activities. Stress is 'a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and as endangering his or her well-being' (Folkman, 1984, p. 840). The measure for relieving stress is to cope with the situation, whereby the person puts in 'cognitive and behavioural efforts to manage (master, reduce, or tolerate) a troubled person-environment relationship' (Folkman & Lazarus, 1985, p. 152). Wilson (1997) highlights that, when information users face an adverse situation, they position their attention and orientation on the threats, or they exercise cognitive avoidance by diverting their attention away from the threat. Doctoral learning is complex and demanding. Naturally, students will be presented with stressful situations when interacting with information. The extent to which stressful situations influence students' information-seeking activity is something that needs to be explored. The present study will explore at what point students experience stress and to what extent the stress influences their information-seeking activities or beyond. When under pressure, people cope either by dealing with or avoiding the stress. The fact is that doctoral students need the information to complete their theses and doctoral programmes. They are bound to experience stress, frustration and anxiety. The question is, how do they cope or deal with these challenges surrounding

their information behaviour activities. Folkman (1984) summarises coping as emotion-focused coping (regulated emotions or distress) and problem-focused coping (managing the problem that causes the distress). Niedźwiedzka (2003) claims that the higher the stress, the more motivated the user will be to enhance the information behaviour; therefore, as the online doctoral students are highly prone to high stress, they may indirectly undergo various emotional and cognitive processes (iterative cycle) until they are convinced that the process has reached the end (coping mechanism).

The second activating mechanism related to the information user, as highlighted in the framework, is the risk/reward theory. The theory rationalises that, if critical information is needed for a pursuit, then the result of losing the pursuit may present a high risk if the information is not obtained (Niedźwiedzka, 2003). In the context of the online doctoral student, information is the lifeline to success in research. Since information behaviour at the doctoral level is more focused, high-level, and narrow, sometimes implementing the behaviour may present challenges or is sometimes unsuccessful. The lack of necessary skills presents the risk of poor information behaviours. In general, the amount of information needed and the nature of the perceived risk may also lead to a halt in the information behaviour activity. The risk may be unnecessary time loss, emotional stress, additional expenditure, and incurred cost. These assumptions will be tested during data collection to determine the risk involved and the extent of the theory within the context of the study. At the same time, information behaviour activities may bring reward. Niedźwiedzka (2003) claims that reward may encourage a feeling of necessity or a desire to eliminate the feeling of uncertainty. For example, the online doctoral students' success in obtaining the right and accurate information for their research may present many forms of rewards, such as fulfilled emotions, feelings of self-achievement, and the addition of rigour to the research. In summary, it allows for their greater confidence to push their information seeking process to greater heights. This study will explore and determine how much of the above holds true.

Another crucial factor that influences information behaviour is self-efficacy, which is part of the social learning theory introduced by Bandura (1977). Self-efficacy (a sense of personal mastery) is about outcome expectancy. It reveals the strength of a person's conviction in being productive and how that will lead to an outcome. Bandura (1977) claims that self-efficacy affects the persistence of someone in taking action and how much effort is put into action. It can be argued that online doctoral students understand that information seeking and the use of information sources may produce

useful and accurate information. However, their self-efficacy (confidence or doubt in their capacity and ability) determines the success or failure of their searching for the needed information. Since information seeking is an iterative process, it may be argued that the repeated process may increase the doctoral students' information literacy skills, hence when repeated long enough would improve their self-efficacy and effectiveness in coping with the stress and risk involved in searching for information. The extent to which self-efficacy influences the doctoral student is an area that will be explored in this study.

While the theories above influence information-seeking activities, Wilson (1997) incorporates human characteristics as intervening variables to explore the outcome of the behaviour of information users, as personal characteristics influence hierarchy and the choices made and how strong the choices are (Niedźwiedzka, 2003). Together with the cognitive aspects of a person, environmental conditions induce specific influences through a set of rules, desired behaviour, privileges, rights, and regulations. Heinstrom's (2002) study on university students as information seekers confirms that information users' personalities influence the extensiveness of information-seeking behaviour. The online doctoral students consist of those from various backgrounds and characteristics. The individual aspects are an essential consideration, as the online doctoral students to be studied consist of those from different backgrounds, environments, personalities and characteristics. The characteristics of the individuals express the identity of the person through biological, psychological, and social development formed by the person's cognitive activities and environment. In addition, Wilson's (1997) framework identifies five human-related variables that are believed to influence information-seeking behaviour and they are discussed below.

The psychological variable considers that the characteristics of a person can act as a barrier to seeking information. It may be due to their value system, the outlook in life, knowledge, emotion, or style of learning (Niedźwiedzka, 2003). The perceived characteristics manifest themselves in the form of existing knowledge, preferences, values or beliefs, prejudices, and interests that may have direct or indirect influence in seeking information (Niedźwiedzka, 2003; Wilson, 1997). The online doctoral students to be studied consist of individuals with unique personalities and characteristics. Their environment may have a direct influence on who they are and what they perceive as acceptable and valid, which may influence their information behaviour.

Wilson (1997) claims that demographic variables (age, gender, education, work experience, and social and economic status) have a direct influence on how people interact with their information environment, especially how they seek information. He emphasises that people's individuality is the result of their positioning in society. The online doctoral students' backgrounds naturally have a direct influence on them as individuals and on how they deal with the doctoral programme's information environment. The different skills and exposure to different education systems, economic, social, and political situations in different countries may shape their exposure to a particular information environment.

The role-related or interpersonal variables link people to their stature or place in a social system (Niedźwiedzka, 2003). When people's roles or interpersonal factors are so deeply ingrained in their lives, they tend to express a certain level of belongingness or rights and privileges that go together with their positioning in society. These variables influence the way people behave and think, whereby specific perceived standards or requirements are expected. Although these factors are at a very personal level, the online doctoral students consist of those from various professions at various levels in organisations. Therefore, the effect of the role and interpersonal characteristics towards information behaviour are factors that need to be explored.

Wilson (1997) argues that variables such as time, geography, and national culture may influence information-behaviour activity. The students' varied geographic locations (country and region) may present different levels of Internet penetration and stability that may have a direct influence on accessing needed information. Also, Wilson (1997) discusses the influence of the national culture introduced by Hofstede as another factor that may influence information behaviour activities (Eldridge & Cranston, 2009; The Hofstede Centre, n.d.). Again, this brings us back to the environmental differences amongst the online doctoral students and how these factors that influence their information behaviour activities should be studied in detail.

The source of information is any form of a human-to-human or human-to-system interaction (Bates, 2006). At this interface, information behaviour governs the exchange of information derived from information sources. Information sources store or contain information and provide information according to the information seekers' specifications. The information sources are an intermediary component between knowledge and information stored (Bitso, 2012). There are two types of

information sources: interpersonal, and the Internet, also known as information carriers and resources. Information sources must fulfil three characteristics to be recognised as such: accessibility, credibility, and channel of communication (Wilson, 1997). For online doctoral students, the information they seek must be credible as proof of academic rigour to avoid any detriment to their pursuit of a doctoral degree. Whenever individuals are exposed to more than one channel of communication, information-seeking is said to increase (Toggerson, 1981), which may be a common situation experienced by online doctoral students.

Wilson's (1997) placing of the intervening variables and activating mechanisms components between information need and information seeking suggest that the theories and attributes specified above are used during those activities. However, the present study questions the rationale of the components' placement. Why are they not placed and linked directly to the person-in-context, as they are properties owned by the individual? Will the theories and background of the information users also have any influence on information processing and use? This is another area that needs further exploration. The extent to which the students' information behaviour could be understood is the extent to which they are known as information users. The present study will, first, identify who the doctoral students are, and then establish their portfolios as information users. Their backgrounds as information users and learners will ensure that their information behaviour is understood.

2.2.2. Information needs

The first step in an information behaviour process is to identify the information needed to fulfil existing gaps. For Wilson (1981), information needs are derived from three physiological perspectives; psychological, affective and cognitive. The need for information builds from affective and cognitive needs. The former for attainment and dominance, while the latter for planning and learning (Wilson, 1981). Others have argued that the awareness of one's lack of information (inner experience) may trigger the information need (Meyer, 2016). Ingwersen and Järvelin (2005) state that information needs arise when a gap is identified in the knowledge of the information user. Subsequently, this need triggers the information-seeking action to close the knowledge gap. In the present study, students fundamentally need the information to fulfil research and learning goals that lead to the completion of the thesis and the doctoral programme. The details of the needs, and the

extent to which their needs support their research and learning and impact their emotion, will be explored.

Apart from the above, information needs may also arise out of an unconscious intention, which may potentially activate an action or sometimes may not lead to any action (Bitso, 2012). This is parallel with the findings from Chu and Law's (2008) study of university students, which reveals information needs as dynamic and as subject to students' existing knowledge. They argue that, as the student's intellect expands, their information-seeking activities and information needs transform from the generic to the specific. Their study confirms that students' information needs are not static but progressive, depending on the phases of their studies. The information needs at the doctoral level are much more complex, drawing from the different perspectives of context, personality and level of awareness (Heinstrom, 2002; Meyer, 2016; Wilson, 2000a). Although the information need may be progressive and at times complex, the competency to search for the required information may vary and influence the outcome of the information search. Kuhlthau (2004) claims that changes in a person's behaviour are linked to the information search process; however, the expertise in information search depends on information literacy skills, an area that needs to be explored during data collection.

Even though information needs are usually associated with students, it is crucial to recognise that information needs are also dependent on the individual's role in society, which acts as a principal generator of cognitive needs that enhance the ability to perform a particular task. In this case, students' roles as doctoral learners will influence their need for information. Their research is expected to contribute to new knowledge and they are expected to achieve self-authorship (Batchelor & Di Napoli, 2006). Therefore, the quality of information they require would have to reflect such expectations. To attain this, the individual goes through a process of planning and decision-making according to the individual's personality structure (Heinstrom, 2002). This process creates affective needs, such as needs for achievement, self-expression, and self-actualisation. However, such aspects warrant further studies, especially in a more holistic and broader view of information needs (Wilson, 2006a).

Information needs trigger other information behaviour activities, such as information seeking, processing or use. However, Wilson (2006) asserts that information needs may not immediately

trigger the response to information seeking. Other factors also lead to this behaviour; for instance, the presence or absence of information, the availability of information sources or the cost involved. It is hypothesised that information behaviour will not be complete without the need for information as a starting point. Past studies showed that information needs were accepted as an essential element in the redesign and improvement of information systems (Wilson, 1981). However, the role information need plays towards overall information behaviour as well as its interaction with other activities is yet to be studied. Authors have suggested that factors that trigger information needs need to be studied to create understanding, to alleviate uncertainties, to broaden knowledge (Case & Given, 2016) and to inspire (Makri & Warwick, 2010), especially among students. Therefore, information need is best served when it ultimately serves or satisfies the individuals' fundamental needs or goals, which are underpinned by their information-seeking behaviour. Since the students in this study are doctoral students who are pursuing their research and writing their theses, their need for quality, relevant and specific information will finally lead to the use of information to fulfil their learning purposes and to complete their research and theses.

2.2.3. Information seeking

Information seeking is defined as activities in which a person engages when a need for information is identified, which involves searching for the information in any way and using or transferring that information (Wilson, 1999a). Information-seeking behaviour is purposive as a consequence of the needs to satisfy some goals (Wilson, 2000a). Information seeking also is defined as a process that changes the state of existing knowledge when the information sought is used successfully (Ahiauzu & Ani, 2015). Rubinić (2014) claims that studies on information seeking are based on Kuhlthau's (2004) information searching and information search process (ISP) conceptual framework. The conceptual framework describes common patterns of users' information-seeking experiences from beginning to end, which involves constructing and learning to accomplish the information-seeking tasks (Figure 2.3).

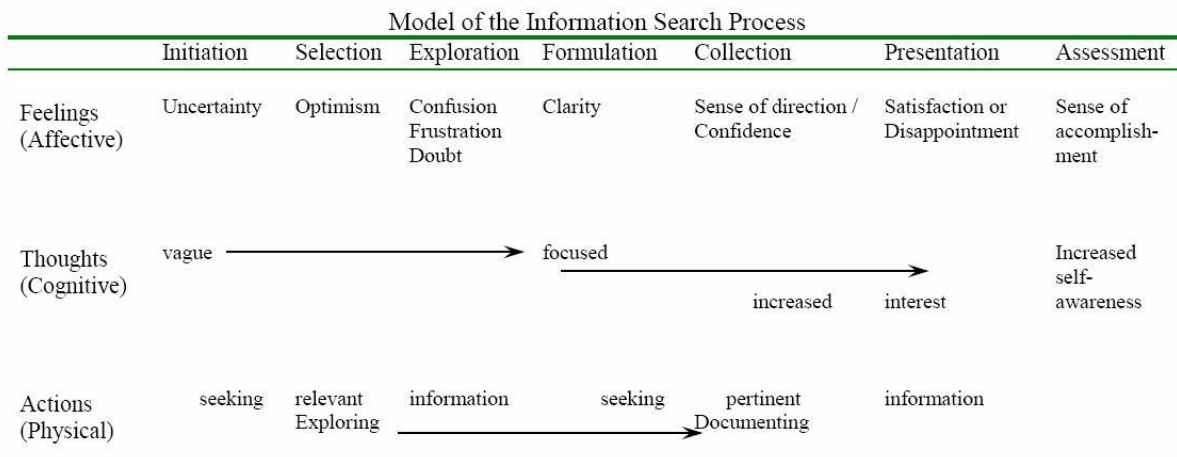


Figure 2.3: Conceptual framework of the information search process by Kuhlthau (2004)

When Kuhlthau (2004) first developed that conceptual framework of the information-seeking process, her series of qualitative studies focused on high school seniors, which she later extended to working professionals. Due to the complexities surrounding information-seeking activities amongst these group of participants, Kuhlthau (2004) divided the process into two domains: time (initiation, selection, exploration, formulation, collection, and presentation) and user behaviour (feelings, thoughts, actions, mood and strategies). She then broadened the user domains into affective, cognitive and physical, similar to that of Wilson (1981, 2006). The conceptual framework presents six stages of information seeking, which are initiation, selection, exploration, formulation, collection and presentation, resembling Ellis' (1989) phases (starting, chaining, browsing, browsing and information retrieval system design, differentiating, monitoring and extracting). Kuhlthau's work was about Kelly's personal construct theory that highlighted the affective influence on information seeking and process to construct meaning. Her studies showed that new information or ideas may increase the feeling of confusion but may also lead to acceptance or rejection of new information or ideas (Kuhlthau, 2004).

Al-Muomen et al. (2012) reviewed the information-seeking conceptual frameworks of Kuhlthau, Ellis, and Leckie et al. for professionals, Wilson and Foster's non-linear information-seeking behaviour conceptual framework, Ford's learning-related information behaviour conceptual framework, and Urquhart and Rowley's information behaviour conceptual framework. It was concluded that the shift in the study of information seeking and information behaviour is growing, whereby researchers have adopted a user-centred approach rather than a system-based approach. The need for information was significantly associated with information-seeking action. The main factors influencing

information seeking are personality, ease and speed of access, familiarity with sources and the level and subject of study (Heinstrom, 2002; Tury et al., 2015).

With the proliferation of the World Wide Web and various technologies, people have access to a large volume of information, making the information seeking process much more dynamic and complex (Jia et al., 2013; Li, 2009). Researchers believed information seeking is the process of searching for information to use and by which to construct meaning to solve a problem or to close a gap, which involves learning and problem-solving at a high level of cognitive processing (Kuhlthau, 2004; Case, 2012; Chowdhury, 2008; Ingwersen & Järvelin, 2005). Additionally, the emergence of social media (Web 2.0) and artificial intelligence (Web 3.0) using mobile technologies has changed the way people seek information. Spezi (2016) claims that, although the information-seeking behaviour of doctoral students follows a steady trend, subtle changes are seen, in particular through the emergence of social media. The study identified that the Web 2.0 technologies' influence on information seeking is relatively at a slow rate; however, it permeates other stages of the research lifecycle, making room for collaboration, information dissemination, and researchers' profile presence – an area worth noting.

Wilson (2000) views the information seeking process as active or passive. Active information-seeking requires a person to take every possible action for information. It is purposive, and information channels are selected accordingly (Bitso, 2012). The trigger is the identified information need and the decision to act upon it (Byström & Hansen, 2005), which forms the information-seeking experience (Foster, 2004). Passive information-seeking occurs when a person is unaware of their information need but stumbles upon the information accidentally without any intention whatsoever (Davies & Williams, 2013). As such, information seeking is not always triggered by information needs but through simple browsing of information, which is also known as serendipitous information seeking (Foster & Ford, 2003; Spink & Cole, 2006), or through proxies such as agents, gatekeepers or intermediaries who are responsible for looking for information for others (Davies, 2013; McKenzie, 2003).

Through a qualitative approach, Barrett (2005) conducted an in-depth interview on humanities graduate student researchers to distinguish their information-seeking behaviour from that of undergraduate students and faculty researchers. His study posits that humanities graduate students'

information-seeking behaviour displays active use of the Internet and information systems as sources of information, relying heavily on instructors for advice and guidance, and facing time pressure to progress in their programmes. However, the majority of the students described feelings of anxiety and discomfort when they started the information search. The students also reported that their level of confidence with electronic resources influences their information search process, but, with the right information support services, they cope better. Graduate students felt more confident than when they were undergraduates, as their level of commitment, seriousness, professionalism and awareness of the electronic resources had grown. The students stated at the beginning of their information-seeking process that the search was relatively generic, but, as their knowledge, skills and competencies increased, the search became more focused (Barrett, 2005). Undergraduate students, on the other hand, applied coping strategies in their search for information and tended to search just enough to fulfil their intended requirements and goals. This supports the fact that information searching is much more complicated than just people interacting with information. This is because the evolving state of various technologies for identifying sources and working towards locating relevant resources for the desired information is a challenge for most students (Bates, 2010). How much of the above will be reflected by the doctoral students in this study is yet to be known, but the nature of their information-seeking behaviours provides ideas for the research design.

Seventy-two percent of doctoral students also engaged in a strategy to cope with information overload (Catalano, 2013; Vezzosi, 2009). The strategies these students employed ranged from using Boolean search, a thesaurus, and various library tools, such as link resolvers or reference linker in databases (Rempel, 2010; Vezzosi, 2009). Although these strategies required some effort to master, the students claimed it saved them time (Vezzosi, 2009). However, they are often discouraged by the complexities of library tools or the systems (Rempel, 2010). Liao, Finn, and Lu (2007) revealed that international students are less aware of library services compared to American students. This lack of awareness indicated that the socio-cultural, physical, organisational and socio-political differences among the students influenced their information-seeking behaviour (Meyer, 2016; Wilson, 2006a).

Also, Chu and Law (2008) found, as university students advanced and became experts in their subject, they also developed their information search skills through four stages of the transitional phase. The first stage is the novice level, where students are confused and are not able to discriminate between keywords and subject search. They go through a stage of confusion (Kuhlthau, 2004). The second

stage is the advanced beginner level, where the students began to gain knowledge on available sources or databases and elevate their search skills. At this stage, they explore different databases, distinguish database categories, keywords and keyword searches, and acquire the ability to construct simple search statements. The third stage is the competent level, where, at this stage, students search with confidence and are satisfied with their search results. They learn to be self-sufficient in information searching and are more successful in getting the desired results. The fourth stage is the proficient level, where the students are competent in information searching and have reached a comfortable search level, where they no longer invest time to increase their skills beyond this level. Although studies on information-seeking behaviour are mainly about the interaction with information systems (Wilson, 2000a), research data from Lacović's (2014) study on graduate students from six disciplines showed graduate students' information-seeking behaviour is also influenced by academic staff, such as the advisers and the professors, a claim supported by Spezi (2016) and Vezzosi (2009). Lacović (2014) highlights that, at the beginning stage of their research process, the students require guidance, recommendations, direction, and resources. While the academic staff are their first point of contact, these students are also supported by their peers, indicating that information-sharing is another vital component for graduate students, because the practice expedites the process of information search. The process of searching for information via other people confirms Wilson's (2006) earlier conceptual framework of information behaviour, where 'information exchange' is one of the components of information behaviour (Wilson, 1981), as shown in Figure 2.4 below.

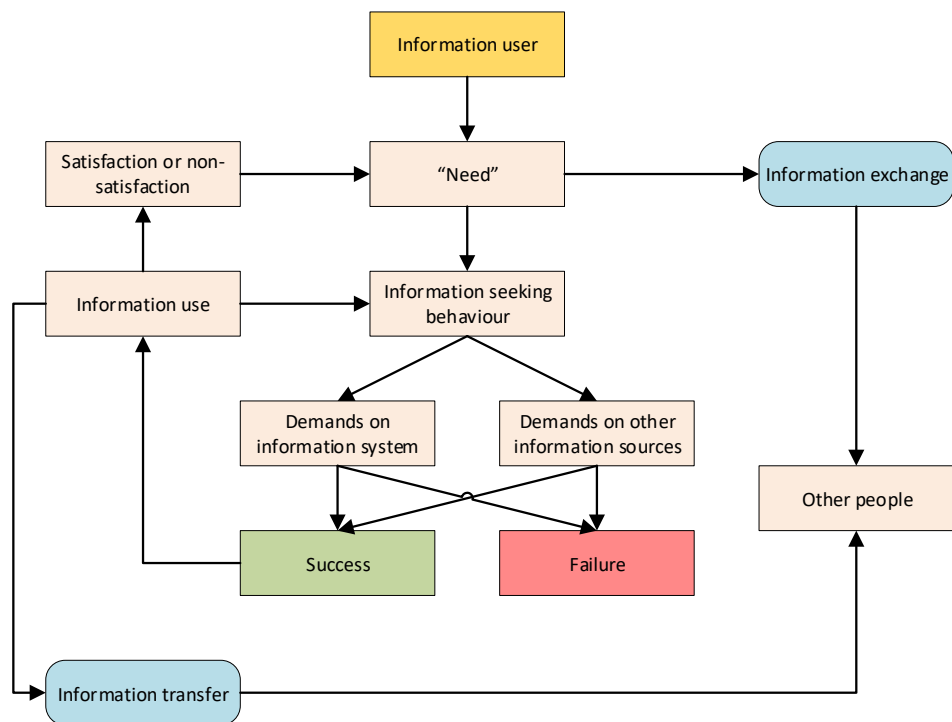


Figure 2.4: A conceptual framework of information behaviour by Wilson (1981)

The graduate students' reliance on authoritative figures suggests that information-sharing is a component that needs to be considered in the present study. Although Wilson's (1997) framework used for this study does not specify the presence of the information-sharing component, this study will still explore the possibility of its presence in the doctoral students' information behaviour. Wilson's (1997) use of Bandura's (1977a) social learning theory to influence information-seeking activities indicates that there is some extent of socialness to information behaviour. Also, where learning is concerned, this study supports the idea that it is never an individual pursuit but one that involves the support of others at some point.

2.2.4. Information processing and use

Most information behaviour conceptual frameworks have overlooked whether the information available and accessible may or may not lead to useful information. The information behaviour conceptual framework by Wilson (1981) (see Figure 2.2) illustrates that it is contingent on the transition from information seeking to information use. The transition process is non-observable, since it takes place at a cognitive level. Wilson (1997) argues that the gap between information processing and learning is imperceptible, and that it is almost indistinguishable. Nevertheless, the

general principle used to determine the value of the information sought lies in the structure and presentation of the information, and only at this juncture is the usefulness of the information determined and decided. Although information processing is non-observable and involves cognitive processing, the present study supports the idea that, at best, the information users will be able to describe their thought-process and relate how they process information to determine its relevance. While it may not reflect the information users' exact cognitive processing activities, the recollection of what goes in the information users' mind is something worth exploring.

The information behaviour activities, such as information need and seeking, will be successful if the information is useful and is used. The outcome status of the information used depends on the factors that create the need for information and the factors that affect the choice of information sources and channels (Wilson, 1997). In other words, information use depends on the context of use as much as information need depends on the situation, which is still controversial and argumentative (Wilson, 1997). In contrast, Choo et al. (2006) emphasise that not all information found may be useful to the information users. Their interpretation of information use involves the selection and processing of information to answer questions, solve problems, make decisions, negotiate a position, or make sense of a situation, all of which is also highlighted by Kari (2010) and Jia et al. (2013). According to Wilson (2006b), whatever the source of information is, it will, at some point, be used, after evaluating and understanding its relationship to the users' needs. Wilson's (2006b) emphasis on the word 'use' may or may not satisfy the user's needs. In any case, the information may, however, be recognised as having potential and relevance to the need of another person (Wilson, 1981), which may be transferred or shared to such a person, an area which is neglected but is reflected in Wilson's (2006) earlier conceptual framework of information behaviour where 'information exchange' (information sharing) was highlighted.

Wilson's (1997) framework that guides the present study shows a straightforward flow whereby, upon successful completion of the information-seeking activity, information processing and use is triggered. If Choo et al.'s (2006) claim, (that not all information found may be useful) is true, then further investigation is needed to ascertain what takes place during information processing and use. The information behaviour process flow depicted by Wilson's (1997) framework suggests that all information found is relevant, and, therefore, is directly processed and use. The extent to which this assumption reflects the reality of the doctoral student is another area to consider. Where

information processing and use are concerned, Choo et al.'s (2006) claim suggest that information processing and use may not be as straightforward as claimed by Wilson (1997), especially when it concerns doctoral students' learning and research. Also, the present study posits that, when students use information, they elevate themselves to a new or higher level as a result of learning. The extent to which information use and learning change the students as learners and individuals is what the author of the present study intends to discover.

2.2.5. Information sharing and the socialness of information behaviour

Lacović's (2014) study on graduate students shows that graduate students seek information from authoritative figures, such as academic staff, advisers and professors; such a finding is similarly claimed by Spezi (2016) and Vezzosi (2009). Lacović (2014) argues that the students need more support at the beginning stage of their research, thus expanding the scope of their information-seeking activities to include their peers. Although Wilson's (1997) framework does not specify information-sharing as part of information behaviour, the use of Bandura's (1977a) social learning theory in his framework suggests the involvement of others at some point. It is, therefore, pertinent for this study to explore whether information-sharing is embedded in the doctoral students' information behaviour.

Many researchers have explored and studied information sharing in a variety of contexts (Wilson, 2010). However, one of the first researchers to draw attention to the role of information sharing (or information exchange) was Tom Wilson. His fundamental conceptual framework of information behaviour denotes that people seek information from others, not only from information systems. He used the words 'information exchange' to focus on the element of reciprocity as the foundation of human interaction (Wilson, 1981). It is hypothesised that, when information is shared with another, the recipients of the information construct their knowledge of a situation or phenomenon. However, this relationship needs to be studied in detail for better understanding.

The research on information sharing lacks critical factors, such as trust, and the risk and reward of information sharing (Wilson, 2010). The probability of information sharing between individuals also depends on the context and the nature of information – e.g., privacy, confidentiality, security,

control, breach of information, and risk. Figure 2.5 shows the risk/benefit trade-off to determine the extensiveness of information sharing.

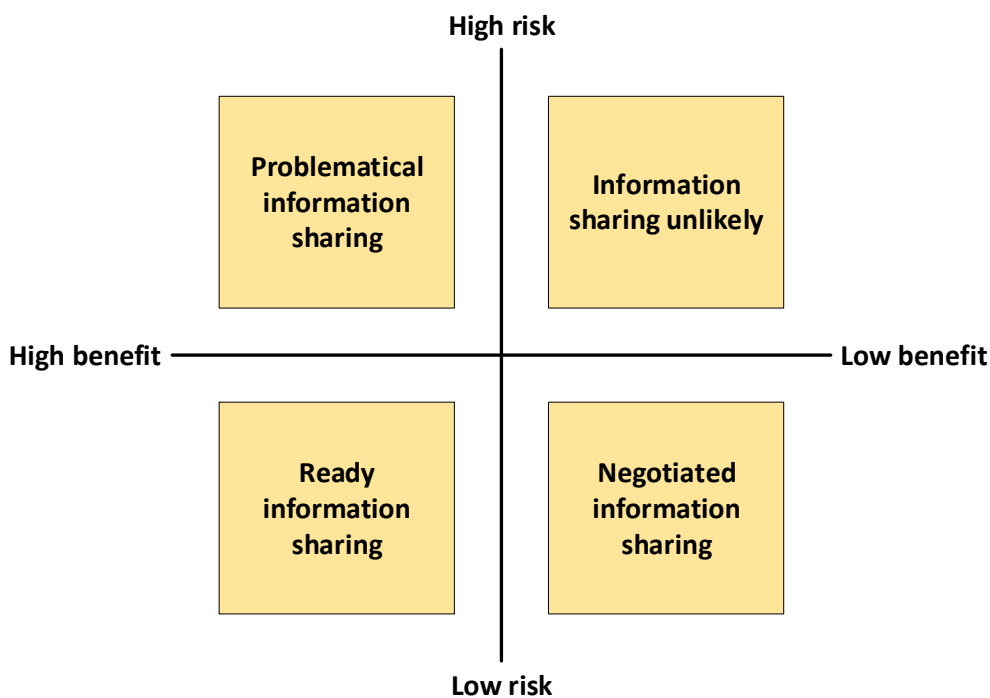


Figure 2.5: The risk/benefit trade-off by Wilson (2010)

As shown in Figure 2.5, Wilson (2010) suggests that information sharing takes place when people perceive that the action has a low risk and high benefit. If the sharing of information is seen as a high-risk activity with low benefits, then no information sharing will take place. Wilson (2010), however, argues that, in such a scenario, other factors come into play, such as personal relationships or friendships that encourage information sharing and where either party is willing to bear the risk, even if the benefit is low or non-existent. Individuals with specific expertise and knowledge are aware of the outcome of information sharing when it can be mutually beneficial for them and for organisations (Constant et al., 1994, as cited in Aydin, 2017). Trust is another crucial factor that, when present, increases the likelihood of information sharing. However, the human factor alone is not sufficient to promote information sharing. The establishment of information systems and information technology is also fundamental to supporting information sharing, especially in the current era of information technology, where the world is seen as a global village.

Talja (2002) had assessed the information sharing practices among academic communities and describes them as omnipresent – a topic that has rarely been taken as a study in its own right. It is suggested that the five facets as proposed by Jia et al. (2013), which are comprised of (1) people, (2) purpose, (3) mode, (4) level of proactiveness and (5) content, are an intrinsic individual activity (Reddy & Jansen, 2008) and are presented as a linear process of stages and an interactive activity (Foster, 2004).

Knowledge management was identified as a sense-making process that encourages users to make sense of and question the usefulness of information until the desired outcome is achieved. Knowledge management not only creates attention on the material embodiment of knowing, but also involves the emotional framing of knowing as presented in the socialness of information behaviour. The collaboration of different parties was found as a significant factor influencing information behaviour, as it represents the totality of behaviour where people work together to recognise the information behaviour activities (Karunakaran et al., 2013). The consequences of collaborative information behaviour minimise uncertainties and complexities to decrease confusion and increase clarity, solve problems or accomplish a task (Karunakaran et al., 2013; Talja, 2002).

The involvement of people during information interaction indicates socialness in information behaviour. The nature of learning amongst online doctoral students is based on a community of practitioners that supports one another. Although a doctoral study is an individual pursuit, where information is concerned, it is not an isolated interaction but one that involves multiple levels of interaction with the technological platforms and other individuals. It has 'socialness' embedded in its foundation (Bawden & Robinson, 2013). The present study argues that information behaviour can only occur in a social context. An isolated individual who does not interact with others for information cannot truly reflect information behaviour. Further exploration is needed to determine the extent of socialness in doctoral students' information behaviour. The present study will explore what socialness means and how it reflects the doctoral students' information and learning environment.

2.3. Information behaviour of online doctoral students

Research on the information behaviour of doctoral students is scarce, especially on those of online learners. ICT is the platform for information interaction for online education, supporting the most complex and high-level tertiary education. Where studies of information behaviour are concerned, research is vastly carried out amongst graduate (master's degree) and undergraduate students. Understanding the doctoral students' information behaviour can provide insights into the complexities and processes of learning in an online environment that may provide insights into strategies informing the existing information support services. Research in the past has focused on on-campus full-time or part-time doctoral students, where a mix of face-to-face and the online medium of interaction is used. Little is known about the information behaviour of doctoral students in an exclusively online learning environment.

In general, Catalano (2013) claims that doctoral students' information needs are more sophisticated and complex. Wisker et al. (2010) claim that doctoral education demands a high level of cognitive development because it challenges one's knowledge, skills and ability to greater heights that present troublesome knowledge and require breaking the conceptual and learning threshold (Wisker et al., 2010). When students use information, learning takes place. Students' learning allows them to gain new knowledge, learn research concepts and develop research skills (Dreyfus, 2004; Wellington et al., 2005). However, the most prominent form of learning at the doctoral level is when, through the use of information, students apply reflection and exercise reflexivity that lead to assuming new perspectives on what constitutes the truth (Batchelor & Di Napoli, 2006; Wisker et al., 2010). When students reflect, they develop the ability to engage in critical dialogue with themselves and develop wider perspectives on things around them (Brockbank & McGill, 2007). However, through reflexivity, students examine their judgements, beliefs and practices to understand their roles in relation to others (Rossman & Rallis, 2010). Reflexivity allows students to become aware of their knowledge's limitations. How much learning occurs, and the extent to which doctoral learning changes the students as a result of information use, are two areas that are of interest.

While knowledge acquisition is the result of information use (Godbold, 2006), Conway (2011) argues that the higher the level of information need, the more advanced the information technology (IT) skills that are required to complete their research. She claims that many graduates lack the necessary

IT literacy skills to seek and identify quality information. The online doctoral student learning environment demands a certain level of digital and information literacy skills to help the students cope with their studies. As much as the results of the present study agree with Conway's (2011) argument, the present study is also designed to explore whether other skills are required to support research and learning at the doctoral level. It is, therefore, pertinent that this factor is explored in this study.

Liao and Han's (2012) study of the Chinese PhD students in Australia revealed that students go through different phases of progress in doctoral education. Their study discovered that the information behaviour of a doctoral student is disoriented at the beginning of their doctoral study. This disoriented behaviour influences the students' effectiveness to search and synthesise information. Liao and Han's (2012) study is also supported by Madden (2014), whose study claims that doctoral students lack confidence in searching for information at the beginning stages of their doctoral programme. The students tend to depend heavily on their supervisors, lecturers and academics, librarians, historians, and selected organisations for information support. However, as they go through an iterative process of searching for information for their research objectives, their information behaviour improves, making it easier for them to identify relevant and irrelevant information. While both studies above demonstrate that doctoral students' information behaviour develops following progress in the doctoral journey, the present study will explore what attributes will be developed and how their development will impact information behaviour outcome.

The Internet is generally the starting point for information search among graduate students. Some have claimed that the resources retrieved from the Internet are unreliable, contributing to information overload (George et al., 2006; Kerins et al., 2004). The Internet is students' first choice because of its convenience, speed, and ease of access. As students access information online, how much of the information is easily accessible, accurate, useful, and trustworthy? One of the critical indicators for doctoral students' information behaviour in comparison to that of master's degree students is that they prefer services and resources with fast access, as this is the most convenient for them. Although both groups of students begin their search with the Internet, doctoral students claim they much prefer a more authoritative source of information, such as their professors, the subject matter experts, and the librarians. George et al. (2006) agree that most doctoral students often consult their advisors for information and advice. The above is supported by Catalano's (2010) study,

in which 92% of education and psychology doctoral students had consulted faculty members and the Internet for information. Also, peers or coursemates are frequently consulted (George et al., 2006). The above provides an overview of the environment surrounding doctoral education.

According to Catalano (2013), the information needs of doctoral students are different from those of master's degree students. The nature of doctoral student requires information from trusted sources, to add rigour and credentials. The author added that, although the Internet and the library provide vast information, at times, targeted and trusted information is required, and the best sources would be those who have experience finding and using the information.

Many studies involving information behaviour were carried out on students in general or grouped by undergraduate or postgraduate students. With the increase in mature students' enrolment (U.S. Department of Labor, 2007) and online education (Tury et al., 2015), there is a need to study the information behaviour of these students to ensure that information and learning provisions meet their expectations. As such, the quality of information support services, and the design and development of the information and learning environment must consider information users' expectations and information behaviour patterns. The next section discusses the role of the information support environment and its relationship with learners.

2.4. The role of the information support environment in information behaviour

The learning environment of the online doctoral student is fully supported by ICT. Hepworth (2007) suggests that social and individual factors must be considered if we are to understand human interaction within the ICT environment, which he believes can inform information strategies. Wilson (2006b) sees ICT as the dominant environment in which information seeking occurs. He hypothesised that the relationship between the information seeker and ICT would likely continue, and that this will strengthen the link between information science and research of information systems.

Spink and Hepworth (2007) claim that the development of online information products and services had been rapid, but they are still technology-driven rather than user-driven, which is reflected in the development and evolution of academic virtual learning environments and portals. With the

advancement in information systems' design and development, information users are still expected to familiarise themselves with and get accustomed to the functions and features offered by information systems, rather than information systems customising and personalising functions and features according to the users' information behaviour patterns. Nevertheless, the emergence of information behaviour studies presents a renewed focus on the psychological (cognitive, affective, conative) and behavioural needs of the individuals (Spink & Hepworth, 2007) in the design and development of information systems. Although the adoption has been slow, the idea saw an emergence in usability and user experience study under the user-centred design discipline. Here, further understanding of information users' culture, learning context, needs, and choices will minimise barriers, realise the usefulness of potential technologies and find innovative solutions. Data on information users is relevant today because they add value to the body of knowledge in information science.

Efforts were made to improve access to information through innovative ICT designs that have provided more stable access to information with faster speed and ease of use, as highlighted by doctoral students in the earlier discussion. However, amid technological growth, the influence of ICT on the information users' access, actions, and reactions (the human aspect) with ICT was sometimes neglected. Bates (2010) argues that users still lack the commitment and effort in information seeking, although the technology has advanced so much that it is almost second nature to humans. This situation has raised questions about how human presence can be incorporated into the ICT environment, making the whole learning support system personal and human-like (Julien & O'Brien, 2014).

In an empirical study conducted by Julien and O'Brien (2014), it was revealed that only 29% of the research on information behaviour discusses the role of the information system. Friedlander (2002) initially found that 40% of students seek information and work on their assignment off-campus. Liu and Yang (2004) also reported that 53% of distance education students accessed electronic resources remotely. However, Catalano (2010) discovered that the prevalence increased to 80% in accessing the library resources remotely, in a study among psychology and education graduate students. Similarly, Kayongo and Helm (2010) reported that more than half of graduate students at the University of Notre Dame accessed resources off-campus. The studies above show that information-seeking for e-resources through the ICT platforms is vital and is an increasing trend for the off-campus

or online information environment. The contribution of ICT, however, has not been widely recognised in information behaviour conceptual frameworks, but evidence indicates its impact as an attribute of context is essential (Meyer, 2016; Wilson, 1999a). Studies of online education context need to incorporate the role of ICT in the learning environment, especially in terms of the online doctoral students' information environment. It should cover all form of information interaction carried out online (library system, online discussion, chat, postings, and information services). Since the studies show that doctoral students rely on ICT and people for information support, the technologically driven and human-driven communication environment through the use of ICT should be assessed and incorporated in coming studies.

Works in the literature show that information search skill was one of the components of information behaviour that significantly supports students' learning progress. Stokes and Urquhart (2011) suggest that the incorporation of this skill into the ICT environment should be recognised as information literacy. The information need of doctoral students is high level and complex; therefore, information literacy is a crucial factor that would enable them to gather relevant information to support their learning at different phases. Information literacy goes beyond knowledge and skills; it encompasses the individual's sense-making and effective use of information. Catalano (2013) claims that the users' comfort level with technology accounts for different information behaviour. Students' skills depend on the discipline of the students and their level of exposure to ICT. Studies by Liew, Foo, and Chennupati (2000) and Sadler and Given (2007) show that engineering and science graduate students have positive perceptions of the transition towards electronic resources, while students in other disciplines find technology a challenge. The online doctoral students may reflect the above, depending on their discipline of studies, exposure to science and technology, and information literacy skills. Sonnenwald and Iivonen (1999), as cited by Meyer (2016), claim that social networks, information resources, and ICT play a significant role in providing access to information and hence increase the students' information literacy skills – another factor to consider in the present study.

The use of ICT changes the way people seek and use information. It is a communication pattern that continues to reinvent itself with the advent of search and communication tools. As ICT becomes more available, accessible and affordable, people immerse themselves in and depend on technology. The uniqueness of ICT in its speed, ease of use, and convenience change the way people seek and use information; ICT provides the kind of efficiency and effectiveness needed by doctoral students. The

acquisition and demonstration of appropriate skills influence the desired outcome, making ICT either a bridge or a barrier (Stokes & Urquhart, 2011). Therefore, information search or information literacy skills training is essential for information users' competency, to help enhance and support their learning experience (Chu & Law, 2008). As such, the extent to which the information literacy skill is needed by the online doctoral students to influence their information behaviour is an aspect that needs further exploration.

2.5. Conclusion

Many factors were discussed and argued in this chapter. The use of Wilson's conceptual framework will provide a guide and boundary for the present research by setting the starting point and the foundation from which to study the information behaviour of online doctoral students. Since Wilson's conceptual framework provides opportunities to ask the 'how' and 'why' questions, because of its focus on the human elements (the activating mechanism and intervening variables) that influence information behaviour, it is possible to explore the experience, thoughts, perspectives, and actions of the online doctoral students when they are interacting with information. While the components in the framework will remain the guiding strength behind the research, additional factors beyond the framework will be explored because they are rational to the context of the research. The following will be used to guide and determine the scope of this study:

1. Explore the significance and influence of the doctoral students' individuality and personal constructs as information users.
2. Identify the components and process flow of information behaviour.
3. Explore the extent of information-sharing towards socialness in information behaviour and learning.
4. Explore the outcome of information use.
5. Identify the significance of the information support services in students' information behaviour and learning.

Chapter 3 : Methodology

This chapter focuses on the research methodology used for this study. It begins with the discussion of ontology and epistemology, presenting the researcher's philosophical stance. It includes rationales on the choices of methods and strategies adopted, and addresses how the researcher understands her insider role in this research project.

3.1. Ontology and epistemology

Ontology is the study of being (Crotty, 1998). It is the fundamental nature of existence that is concerned with what constitutes reality. It considers the kind of things that exist, the condition of their existence, and the relationship between these things (Blaikie, 2007). The present research focuses on online doctoral students' information behaviour where students' will relate their experiences, perspectives, actions and reactions when interacting with information. Here, the very nature of the doctoral students' reality surrounding their information behaviour is derived from the students' perspectives of how they view their information behaviour through their understanding. As such, the ontological approach of this study is derived from relativism, whereby the very nature of reality is derived from some form of activity as perceived in the human mind (Mosteller, 2008).

According to Crotty (1998), human behaviour is a complex and subjective paradox that is not governed by one single reality but is formed by the attributes of a person. It depends on how the person under study perceives reality and rationalises reality, with underlying constructs on roles, values, background, motives, and constraints while in pursuit of the truth (Blaikie, 2007). In the present study, it is how the participants rationalise their behaviour around information at the thesis preparation stage. Although this study assumes that the participants under study are intelligent, self-aware, wilful, and reflective (Gray, 2014), and are in pursuit of doctoral-level knowledge, their human attributes still limit their perceptions and rationalisations about their reality (Mertens, 2015). Considering the subjectivity of what constitutes reality, inductive reasoning was used to draw a conclusion about the meaning of reality (Gray, 2014). The use of inductive reasoning allows for the identification and understanding of behavioural patterns (Bradford, 2017) when the participants rationalise their behaviour and experiences around their information environment.

The way the researcher concludes and perceives reality is known as epistemology. Epistemology is the philosophical study of knowledge and justified belief (Moses & Knutsen, 2007). It is concerned with how knowledge is acquired and what is believed to be accurate by the researcher. This researcher adopts the epistemological stance that knowledge is created, acquired, and communicated based on how the participants perceive their reality and how the researcher interprets this reality (Scotland, 2012). The dataset consists of the experiences, perspectives, and action rationales provided by the participants. It is the individuals' perceptions that form shared meaning, as interpreted by the researcher. Interpretivism is the epistemological stance supporting the present research. It displays how the researcher interprets and shapes meaning while pursuing knowledge (Dudovskiy, 2017). Interpretivism views the individuals as intricate and complex beings, with their reasoning (Dudovskiy, 2017). It views knowledge gained as socially constructed through language and shared meaning, meaning that social actors give to their actions. It allows the researcher to understand (or interpret) the participant's constructed meaning of reality (the lived experiences) (Gray, 2014) to understand their information behaviour.

3.2. Research methodology

The subjectivity surrounding the present research requires the adoption of a qualitative approach, because it explores the participants' related perspectives and experiences of information behaviour at their thesis preparation stage. The dataset collected from the participants is developed through their senses, consciousness, and cognitive processes that were communicated through the use of language and words (Scotland, 2012). This dataset is subjective and presents rich meaning, influenced by the quality of the data. The value of qualitative research, in essence, relies on the quality of the data rather than on its quantity (Mason, 2014; Silverman, 2010).

The present research is a single-case study. It focuses on a group of participants that fit a specific context (the case). It explores the information behaviour of the online (characteristic) doctoral students (a group of people) in the thesis preparation stage (parameter and boundary) in a doctoral programme offered by a British university (one organisation in a real-world context). The parameters highlighted above describe the definition of a single case study that Yin (2014) defines as an in-depth

inquiry that explores a current phenomenon (the ‘case’) within its real-world context. The single case study also seeks to understand the knowledge of individuals, groups, and organisational, social, political, and related phenomena (Yin, 2014) within a defined system (Cresswell, 2012). Case studies are chosen because they have temporal characteristics that define their nature, confined by geographical parameters and boundaries, characteristics of the group, and arrangements of the organisation or institution (Cohen et al., 2011). The study on the information behaviour of the sample population mentioned above provides the opportunity to study a population that fits the current time and scenario, given the current circumstances. It also assumed that students’ interpretations of their realities might change, if data were collected at a different time and on a different group of participants. The uncertainty and subjectivity surrounding the present moment are what make the research unique. It is what makes it a case, a research study that fits the current characteristics of a group of people within a specific timeframe, and in a real-world context (in a real organisation).

Figure 3.1, below, provides an overview of the research design from ontology to the data analysis phase. The discussion, above, provides a detailed explanation of ontology, epistemology, and methodology. The remaining sections will discuss the data collection and data analysis phases in detail.

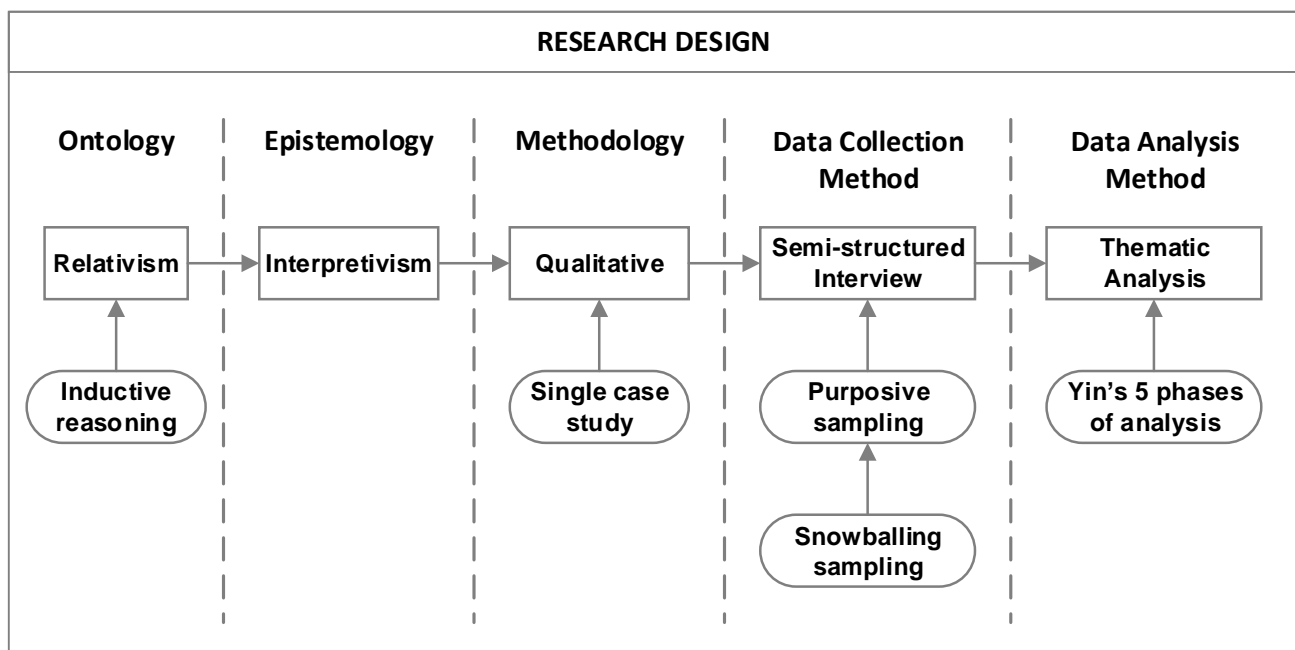


Figure 3.1: An overview of the research design

3.3. Data collection

Semi-structured interviews (Gray, 2014) were used to collect data. The use of a semi-structured interview engaged the best of two techniques by establishing standard responses among participants while encouraging freedom of expression at the same time. Structured questions were utilised to generate standard datasets from all the participants, while the unstructured (open-ended) questions allowed for rich and deep datasets.

This study adopts Wilson's (1997) information behaviour conceptual framework, which provided the structure and scope of the research design. Wilson's conceptual framework specifies the core components associated with the information interaction process and identifies human attributes that govern each part of the process, through information needs, information-seeking, and information processing and use (Wilson, 1997). The components in the conceptual framework were utilised to shape the interview questions and their scope and to guide the research design in general. The interview questions were categorised according to the scope of the research questions (see Chapter 1). The first part of the interview protocol was designed to answer research question 1 and 2. It contained questions on the doctoral students' demographics, information behaviour (questions are grouped into information needs, seeking, processing and use, and sharing) and learning. The second part was structured to answer research question 3 and included questions on information support services. While the scope of the research was identified, the last part of the interview protocol included one open-ended question to cater to additional information that was not covered by the interview protocol. Probing questions were also prepared to allow for further questioning as a result of the participants' answers, the aim of which was also to enrich the interview discussions and interactions in order to garner further responses and views that may open new pathways not initially considered as part of the interview (Cohen et al., 2011). The questions were designed to generate precise responses from the participants and to elicit as much information as possible about their present lived experiences within the information environment.

The interview questions were reviewed by the thesis supervisor and two critical friends for clarity of the sentence structures, construct of the questions and content that represent the intended ideas and to answer the research questions. The review process ensured the questions were precise, not ambiguous, and, most importantly, able to provide accurate data to answer the research questions,

as specified in the paragraph above. According to Galletta and Cross (2013), engaging critical friends outside the research area allows for constructive and truthful feedback without bias. The critical friends helped refine and organise the interview questions for the pilot study. Once the interview protocol was reviewed and finalised, the selection of the research participants began.

3.4. Participant selection

Selecting the right participants is essential to any data collection process. The targeted group, if represented accurately, can generate valuable datasets that have the potential to answer the research questions. Northcote (2012) claims that the use of selection criteria guides the researcher to identify participants that fit the nearest representation of the group and phenomenon under study. Online doctoral students from a university in the United Kingdom were selected for the study because their information behaviour may inform the current information support services in their university. The level of information that they need, seek, process and use is unique at each phase of the thesis preparation stage. As they progress through different phases of the thesis preparation stage, the amount and complexity of information needed changes and increases (Catalano, 2013). The data collection process involved two participants in the pilot study, and fourteen online doctoral students and five thesis faculty members in the actual interview. The participants were recruited using the selection criteria listed below:

1. Thesis students:
 - a) Enrolled fully (100%) in online education.
 - b) In pursuit of a professional doctoral degree.
 - c) Registered in the thesis stage.
 - d) Used the information sources and support services (any form of information systems such as online library, Blackboard, university website, community page, chat program, and support personnel provided by the university).
 - e) Is either in the pre-ethical or post-ethical approval stage but have not submitted the thesis. Pseudonyms to be used on the students at each stage are “pre” (e.g., pre5) and “pst” (e.g., pst4).

2. Level 1 thesis faculty:
 - a) Is a thesis supervisor.
 - b) Provides thesis preparation-related information.
 - c) Has direct access (supervisor-supervisee relationship) to students.

3. Level 2 thesis faculty:
 - a) The faculty member who oversees the thesis stage.
 - b) Provides overall information to thesis supervisors, and/or to thesis students.

3.5. Sampling technique and sample size

The sampling technique adopted in this research is purposive sampling, a form of non-probability sampling that is selective towards targeted participants in a group that share some commonality (Blaxter et al., 2006). This group of participants consists of those who have full knowledge of the specific phenomenon and share a definitive system or organisation (Cohen et al., 2007). With the technique, the researcher was able to recruit targeted participants who represented specific characteristics, and who had the right knowledge and experiences (Cohen et al., 2007) to answer the research questions.

The participants recruited for the pilot study were those who had prior contact and communication with the researcher. The sample size ($n = 2$) was decided by those who volunteered to participate in the pilot study. The online student sample size selected for the actual interview was more structured and adopted three selection methods recommended by Marshall et al. (2013). The researchers claim that, if a qualitative study combines the following three sample size selection methods, it solidifies and rationalises one's justification for the selected sample size. The recommendations for the sample size selection methods are as follow:

- 1) To benchmark a sample size recommendation provided by qualitative methodologists.
- 2) To benchmark a sample size used in past research, in this case, past research on information behaviour.

3) When the actual data collection process is carried out, the researcher is to recognise that the saturation point is reached, and is to collect a few more datasets beyond the recognised saturation point, for confirmation.

Following the three recommendations above, the discussions below provide a detailed description and justification for the sample size selected for this research.

- 1) Marshall et al.'s (2013) comparison study revealed that qualitative single-case study methodologists recruit between 15 to 30 participants for each case.
- 2) From the analysis of four past studies on information behaviour that adopted the interview method, an average of 15 participants were recruited (Al-Muomen et al., 2012; Madden, 2014; Pinto et al., 2010; Stokes & Urquhart, 2015).
- 3) Finally, Marshall et al.'s (2013) comparison study also highlighted that interview datasets reached their saturation point by the twelfth interview. Using this as a benchmark, the researcher at the same time identified the final saturation point from the actual data collection process.

The three sample size numbers from each method mentioned above were identified and averaged to select a sample size for the student participants. Table 3.1, below, summarises the numbers used by others and the sample size decided for the study.

Table 3.1: The sample size adopted from Marshall et al.'s (2013) three methods

Sample Size Selection Method	Benchmark
1) Qualitative single-case study methodologist	15
2) Past studies on information behaviour	15
3) Comparison study - interview saturation point	12
Sample size selected for this research (average):	14

Although the analysis above resulted in 14 student participants as an average sample size for this research, it remained a benchmark, not an absolute number. Kumar (2010) claims that qualitative research does not start with a selected sample size, but is influenced by the data saturation point.

Although Kumar's (2010) claim is valid, the present research selected 14 as its sample size reference point for the recruitment purpose but remained mindful of the actual dataset saturation point. The primary use of the sample size was to set a reference point for the recruitment process, and to prevent sending repeated 'invitation to participate' e-mails to the general population, which would have caused delay and loss of momentum.

At the time of the research, 165 professional doctorate students were enrolled in the thesis preparation stage (thesis student population) (Lucilla Crosta – Thesis Faculty Manager, personal communication, December 16, 2017). Among them, 14 student participants volunteered for the data collection process. Marshall et al. (2013), in their comparison study, highlighted that the saturation point for interviews is achieved by the twelfth interview. Using 14 as the sample size allowed the researcher to add several interviews past the saturation point for confirmation, as advised by Marshall et al. (2013). The data collection involved the professional doctorate students who were formally enrolled in the thesis stage starting September 2016.

The initial student participant recruitment exercise did not generate adequate responses. The researcher later applied a second technique (snowballing technique) that resulted in fulfilling the selected sample size number. Through the snowballing technique, the researcher requested the interviewees to recommend other cohort members who were among their contacts, who would be willing to participate in the research. Although the recruitment technique diverted from the preferred method (random and voluntary participation), the segregation of the students (those in the pre-ethical and post-ethical approval stages) were successfully recruited equally, which fulfilled the original plan. In total, 14 participants were recruited by the end of the interview process.

The recruitment of the thesis faculty members applied the same technique (purpose sampling) as that of the students, but its sample size ($n = 5$) was based on responses received. Nevertheless, the saturation point was reached by the fourth interview, although five thesis faculty members were recruited and interviewed.

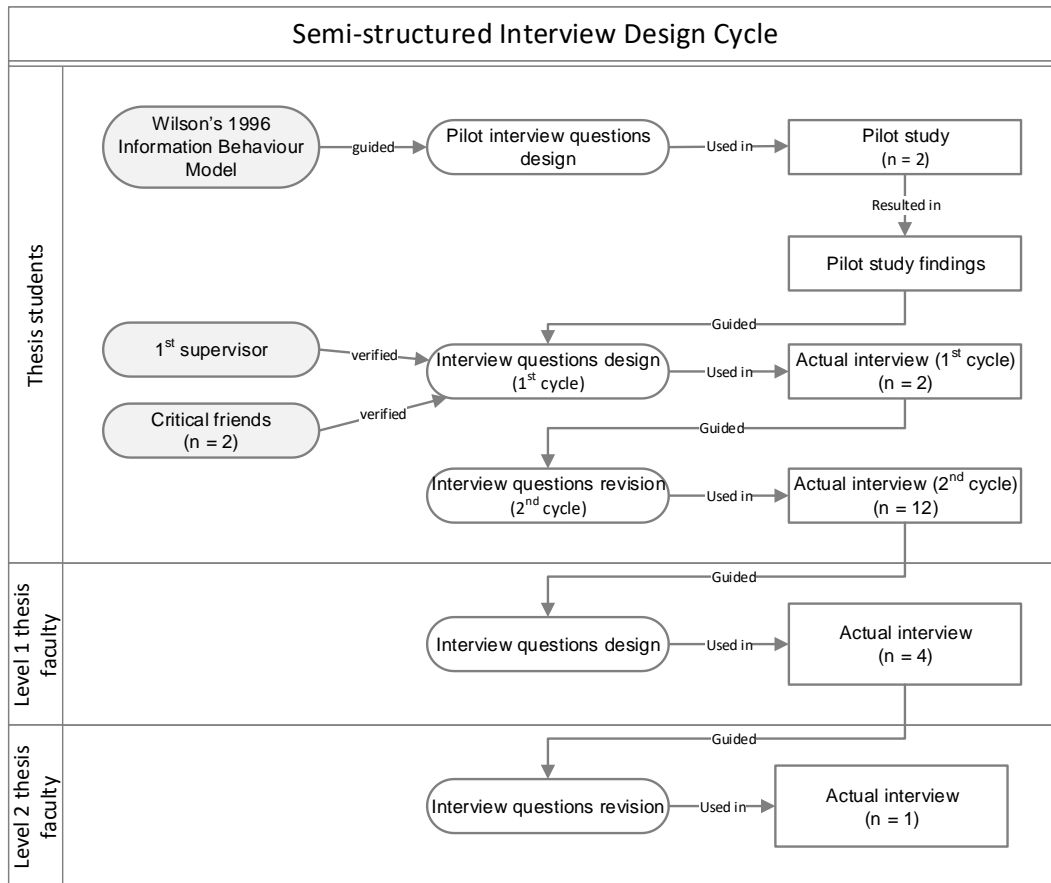


Figure 3.2: An overview of the interview design cycle

Figure 3.2 shows the interview questions design process and categories of interviewed participants. The interview involved three groups of participants who are users and sources of information in the thesis preparation stage. The discussion below provides a detailed description of their attributes and roles (please refer to the participant selection criteria in section 3.4).

- 1) **Thesis students:** The online doctoral students who are in the thesis preparation stage.
- 2) **Level 1 thesis faculty:** The thesis faculty members who are directly involved with the thesis students, channelled through the information support services offered by the university.
- 3) **Level 2 thesis faculty:** The thesis faculty member who is directly or indirectly involved with the thesis students through their thesis supervisors, channelled through the information support services offered by the university.

3.6. Pilot study

A pilot study was conducted before the actual interview, which ensured the accuracy and robustness of the interview protocol by providing a trial run for the interview process and in turn receiving constructive feedback from the pilot study participants. Although experts in qualitative studies suggest that the pre-testing phase is not always necessary (Van Teijlingen & Hundley, 2001), it remains valuable as potential problems can be identified and corrected before the actual data collection exercise begins (Cohen et al., 2011; Van Teijlingen & Hundley, 2001).

Two participants were recruited for the pilot study, and the interviews were conducted via Skype. The interview sessions lasted around 45 minutes. The pilot study allowed the researcher to connect the experiences, theories and concepts surrounding information behaviour. It also provided a platform from which to experience and identify essential details that can occur during the actual interview. The interview content was transcribed, and the interview activities were noted to gauge whether meanings and cues could be interpreted from what was communicated and observed.

The pilot study revealed valuable insights into the interview, its data, and its process, considering the researcher's lack of experience. While the interviews garnered sufficient data, several weaknesses were identified in the interview questions and interview practice. The main weakness was that the interview questions did not gather enough data to reflect in-depth information behaviour patterns. Some important parts of the information behaviour practice questions, such as those related to information-use, were lacking. The absence of probing questions in the interview protocol also caused inconsistencies in questioning (probing) between two participants, resulting in some inconsistent data and the inability to compare participants. It also limited the opportunity to explore meaningful, in-depth human reflections on the process and insights into the information environment of the participants. Also, the absence of an open-ended question at the end, for gathering additional information from the participants, was seen as a missed opportunity. It was supposed to be an opportunity to gather additional information that the participants may want to share but that was not thought of by the interviewer; however, its absence hindered freedom of expression. Brinkmann and Kvale (2015) claim that interviewing skill is a craft and requires practice. It requires the interviewer to have the ability to orchestrate the flow of interviewer-questioning and interviewee-answering in a coherent but natural manner. However, the researcher's lack of

experience in conducting an interview affected how natural and fast the responses were countered, which led to a few silent moments and delays in finding the right words to respond to the participants. In general, the interview sessions were formal, lacked natural conversation and lacked directing the interviewee towards the intended goals, which resulted in lengthy interview sessions.

While the pilot study revealed early warnings and highlighted prominent weaknesses, the sessions provided valuable lessons for the researcher, who is a novice interviewer. The events experienced during the interview sessions indicated that the events may occur during actual interviews. The oversights provided opportunities for improvement, and also allowed the researcher to anticipate and experience how a real interview feels, which was critical for the real event. The anticipation allowed the researcher to mentally and emotionally prepare for the actual event. It also revealed how questioning and sentence structure impacted participants' responses, emphasising that probing is the key to a successful interview.

Findings from the pilot study revealed that the participants' information needs and use are different while in the pre-ethical and post-ethical approval stage. The type and complexity of information needed and used increase as the students shift their position from the pre-ethical to the post-ethical approval stage. Students at the pre-ethical approval stage require process-oriented information to identify the right documents and to understand the next course of action that leads to ethical approval. They are focused on process-oriented information that informs action: the kind of information that is structured and straightforward. Students at the post-ethical approval stage, however, depend upon information that explores the complexities of research: information that could break the troublesome knowledge threshold, explore unknown territory, and challenge their skills and critical thinking. The information needed at this stage is more complicated and may not be readily available at times. These findings were crucial and would exhibit different behaviour patterns among the two groups of participants. The components identified from the above were added to the student-participant recruitment selection criteria.

The pilot study also confirmed that the thesis faculty members act as sources of information to the students, which is a component not considered in the initial research plan. Since their role provides an outsider's perspective into the students' information habits and behaviour, they were added to the list of participants to be recruited for the actual interview.

The pilot study provided valuable insights into the strengths and weaknesses of the interview questions and interview practice. As a result of the experience, the criteria for quality interview practice proposed by Brinkmann and Kvale (2015), Mears (2009) and Seidman (2006) served as guidelines for the actual interview. According to Brinkmann and Kvale (2015), interviews that reflect quality should be spontaneous, specific, rich, and should garner relevant answers from the interviewees. They proposed the shortest-interview-questions and longest-subjects-answers principles. Mears (2009), on the other hand, emphasises the importance of relationship, rapport, asking the right yet flexible question, and active listening. Finally, Seidman (2006) also suggests the importance of listening, minimising talk, following up, adding laughter, following hunches and tolerating silence. While all of the above constitutes valuable advice and suggestions, the application also relies on the particular situation of the interview, the interviewer-interviewee dynamics during the sessions, and the experience and the skills of the interviewer.

In conclusion, the pilot study allowed the researcher to re-strategise the interview process and its components through the following:

- 1) Probing questions were added to explore in-depth insights and experiences of the participants.
- 2) The interview questions were restructured to allow freedom of expression.
- 3) Repeated questions and questions sharing similar goals were consolidated.
- 4) Pre-ethical and post-ethical approval stages were added to the participant selection criteria list.
- 5) The thesis faculty members were added to the participant recruitment list.

3.7. The interview process

Upon obtaining ethical approval, the prospective participants were contacted via e-mail using a generic e-mail list that was created for the students and thesis faculty members. The recruitment process was initiated with an 'invitation to participate' e-mail, with the participant information sheet and the participant consent form attached. Upon receiving confirmation from the participants, the interview questions were provided to the participants before the interview session. Although the approach is not necessary, providing questions in advance helped the participants decide if they were

willing to proceed with the interview (fully informed consent), clarify unclear areas, and reflect on their information behaviour activities. The decision was based on the consideration of completeness in answer versus potential forgetfulness versus spontaneity or top-of-the-mind responses. As such, it was decided that providing interview questions in advance would garner richer data, eliminate wasted time in recalling events, and establish a preliminary interviewer-interviewee relationship. A Google spreadsheet was created to provide instant access to interview information and to allow participants to book their interview session. This open platform provided flexibility, minimised e-mail exchanges and avoided delays in finalising the interviews' date and time.

The interviews were conducted through Skype, an online telecommunications application software, and were recorded using the eCamm recorder, chosen for its capability to record high definition and high-quality audio and video with a simple interface (Quella Reviews, 2017). The interview started with an introduction session to establish the bond between the interviewer-interviewee, set the tone of the interview and create a conducive environment. Brinkmann and Kvale (2015) claim that an interview is a craft and is not an exact science. Setting the stage for the interview during the first few minutes is a decisive point because, at this juncture, the interviewees closely assess the interviewer to decide if they could speak freely and share their experiences and feelings intimately with a stranger (Brinkmann & Kvale, 2015). An introduction to the research background, purpose and terminologies was initiated at the beginning of the interview session.

Throughout the interview session, the interviewees were allowed to provide their answers at their own pace. The interviewer paid close attention to the interviewees' responses, and, when necessary, the questions were repeated for clarity. At the end of the interview, the interviewees were requested to add any additional comments or insights that they thought were pertinent in order not to omit any crucial data. The interview session concluded with a note of appreciation, and transcripts were provided to the interviewees for content verification and validation. Each interview session lasted between 40 to 50 minutes in general. The interviews with participants who had prior interaction with the researcher lasted between 50 to 80 minutes, due to their level of comfort and familiarity with the researcher.

3.8. Transcription

The interview and transcription processes were carried out concurrently. Transcription is a conversational interaction between two people that is extracted and presented in a written form (from oral to written language) (Brinkmann & Kvale, 2015). To ensure that the interview content and activity were captured to their nearest form, personal notes were taken during the interview sessions, and the interview content was transcribed within three days. The notes captured elements that were not spoken but expressed through tone, facial and bodily expressions. The researcher produced verbatim transcriptions in which each transcript needed between four to six hours of turnaround time. The recorded interview was played back using the VLC Player through its slow playback feature, to help capture spoken words in slow motion. The transcription went through a two-process cycle. The first cycle involved capturing and documenting the recorded interview word for word (verbatim) through slow playbacks. The second cycle involved listening to the recorded interview to verify the accuracy of documented words. The format and style of transcription documentation reflected Bancroft's (2016) transcription protocol, wherein audible or inaudible voices, nonverbal sounds, pauses, sensitive information, and comments followed specific representation. The final transcripts were sent to and confirmed by the participants for accuracy. Three transcripts had minor revisions, and they were re-confirmed by the respective participants.

3.9. Data analysis

The data were analysed using thematic analysis in NVivo. During analysis, the data were separated according to Wilson's information behaviour conceptual framework's components: person-in-context, information needs, information seeking, and information processing and use. Subsequently, codes, categories, and themes were identified under each information behaviour component. Although Wilson's conceptual framework specified three information behaviour components, a new information behaviour component emerged from the data, the details of which shall be discussed below. Yin's (2016) five phases of analysis were used in data analysis (Figure 3.3). The phases of analysis were not sequential. It involves moving backwards and forwards to refine the data and the analysis process. Details of data analysis in each step are discussed below.

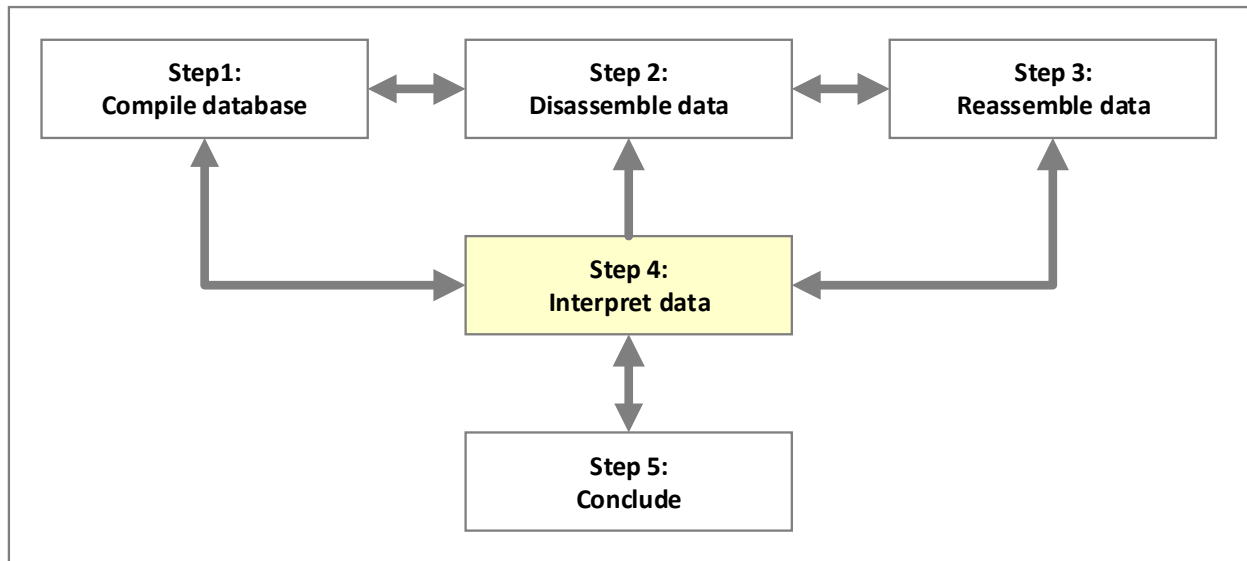


Figure 3.3: Yin's (2016) five steps of analysis and their interactions

Step 1: Compiling the data

The first step involved creating the database (textual data from transcripts) in NVivo. According to Yin (2016), organising the data in an orderly fashion helps strengthen data analysis. Students' data were separated into two groups: students at the pre-ethical and post-ethical approval stages. The faculty members' data were grouped into one folder.

Step 2: Disassembling the data

This phase aimed to establish clear connections between the data and the research ideas (aided by the research questions). It required moving back and forth to connect the initial ideas to new conjecture or thoughts. Ideas were recorded in the memo, which was kept and used throughout the analysis. Saldana (2013) encouraged writing anything that may be significant for coding or analysis. This phase involved coding the raw data in the transcripts. Saldana's (2013) first cycle coding (coding and categorisation) method was applied in this phase. It involved comparing data to data, data to code, code to code, code to category, category to category, and category back to data, making the qualitative analytic process a cyclical one (Saldana, 2013).

The coding process was carried out in two rounds. The first round produced a set of codes. However, there were duplicates and errors among those codes. As a result, the second round of coding was

carried out to improve the codes' sentence structure, merge duplicates and remove errors (cleaning of data). Attribute and descriptive coding were used in the first cycle coding. Attribute coding highlighted specific attributes belonging to students' information behaviour. For example, attributes were related to students' ICT competency levels (e.g., basic, intermediate, advanced), or students' information sources from the university (e.g., online library, Blackboard, university website, community page, chat program), or people that were involved in information sharing activities (e.g., supervisors, fellow students, subject-matter experts). Descriptive coding summarised or described in short phrases the students' thoughts, perspectives, actions and activities experienced during their interaction with information.

In the categorisation process, the codes were grouped into common categories. Yin (2016) calls them a 'higher set of codes'. Again, descriptive coding was used here. Throughout the categorisation process, the research questions and Wilson's information behaviour conceptual framework were reflected upon to identify connections and information behaviour patterns. The disassembling of data in this phase was meticulous and detailed. Every sentence and experience gathered from the transcripts were carefully read, analysed and grouped.

Step 3: Reassembling the data

In the reassembling phase, the thinking expanded towards identifying the broader meaning of the data and how they revealed valuable or new insights into the research. The focus was to search for emerging patterns (themes) to move towards a 'higher conceptual plane' (Yin, 2016). Saldana's (2013) second cycle coding method was applied in this phase. It adopted pattern coding, where identified categories were grouped into a few themes (Saldana, 2013). From the identified categories, a series of questions were asked to identify emerging patterns. For example, how were the events or experiences related? Were the emerging patterns moving towards the discovery of new knowledge? How did the patterns relate to the information behaviour concepts? The questions helped in sorting out ideas, carrying out comparisons, and identifying emerging patterns. The data were continuously sorted and matched under different arrangements to finalise the themes and answer the research questions. The second cycle was more challenging because it required data to be classified, prioritised, integrated, synthesised, and conceptualised to identify its contribution to new knowledge.

Step 4: Interpretation of data

The identified themes for the research shaped the basis of interpreting the findings. Yin (2016) describes interpreting the data as the craft of giving meaning to the findings. The goal here was to develop a comprehensive interpretation of the themes to help understand the entire research. According to Yin (2016), a comprehensive interpretation displays the following attributes.

1. Completeness – Does it have a beginning, middle, and an end?
2. Fairness – Would others with the same attributes reach a similar understanding?
3. Empirical accuracy – Does the interpretation represent the data?
4. Value-added – Is the interpretation new or repeated from the literature review?
5. Credibility – How would researchers in this area accept the interpretation?

In his book, Yin (2016) introduced three modes of interpretation: 1) description, 2) description with a call for action, and 3) explanation. The 'description' type of interpretation is represented by the descriptive framework that reflects the meaning of the findings. The 'description with a call for action' type of interpretation tries to encourage subsequent actions, for example, calling for policy changes. Finally, the 'explanation' type of interpretation focuses on explaining how or why events happened, or how or why people said what they said. The interpretation of the findings in the present research adopted the 'descriptive' type of interpretation. The example in Figure 3.4 uses a descriptive sentence to present a theme from the information needs component.

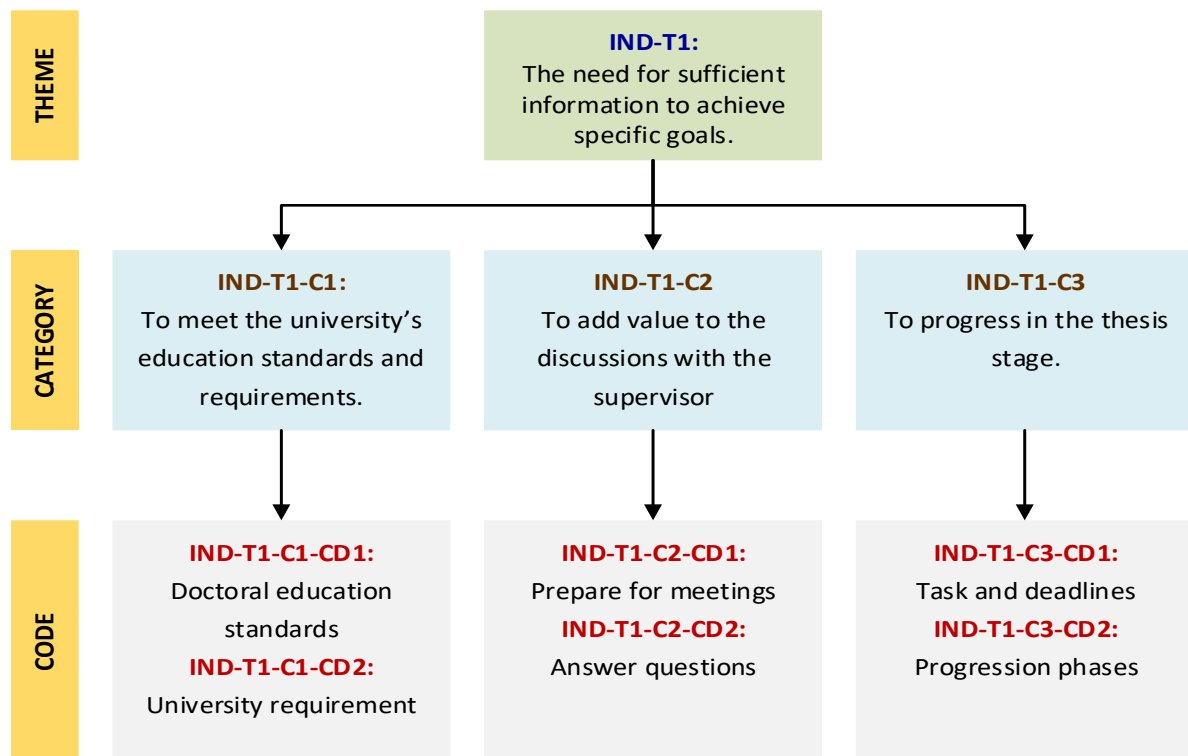


Figure 3.4: The use of the 'descriptive' type of interpretation for information needs

Step 5: Conclusion

The data analysis and the interpretation of the findings led to the emergence of two significant information behaviour patterns (contribution of new knowledge). The analysis and findings led to the discovery of 1) information-sharing and the socialness of information behaviour, and 2) the influence of usability concepts in the design of information support systems. As a result, Wilson's (1997) information behaviour conceptual framework was expanded to include the information-sharing component. In the context of the online learning environment, student's information behaviour expressed the concept of 'socialness of information behaviour' that influenced learning behaviours and students' transformation. Details are discussed in Chapter 4 (findings).

3.10. Reflections

As a novice researcher, I always felt the effectiveness of collecting data questionable. There was never a moment of certainty, from the moment the interview questions were drafted to the moment they were used to gather data. How can anyone be certain that the questions would sufficiently garner rich and robust data to answer the research question? Even with the help of critical friends and the supervisor, the best-formed questions still depend on the human ability to critically analyse and fine-tune them to mirror perfection. What sets interviewers apart here is their command of the language, their craft of asking questions, and their personable approach towards the participants (Mears, 2009; Seidman, 2006). Ultimately, an interview process done repeatedly over time polishes the skills of the interviewer and transforms the interviewer into a skilful artisan with the ability to manoeuvre the interview in every possible direction. Brinkmann and Kvale's (2015) describe interviewing as a craft and rightfully so. As a novice, I found that every aspect of the interview process, the structure, and the practice comes into question if the participants are to reconstruct their experiences as accurately as possible. I realised that no matter how diligent the interviewers' efforts are, one fact remains, they will always be in the picture. It is inherent. This inclusion exposes personal weaknesses and biases. In a study done by Roulston et al. (2003), novice researchers noted there were challenges for both interviewer and interviewee. Among them, unexpected participants' behaviour can change the whole dynamic of the interview. Others include participants tardiness for the interview session, discussing sensitive topics in the presence of a minor, and conducting the interview in a non-conducive environment without any privacy. These challenges affected the mental and emotional status of both parties which influence the authenticity of the interview results. Thus, interviewers need to remain objective and be aware of their own biases throughout the interview. A researcher should remain mindful of every action and decision made to ensure objectivity is at its optimum level.

As an interviewer, I found there was never a moment of sureness when the scenario involved the participants. The experiences shared by the participants tell a story. Even when the story is articulated well, there is no guarantee that the participant's interpretation of their experiences represents their reality. It is, at best, relative. Given the same circumstance, can the reality of one participant represent that same reality for others? Would the meaning be communicated and interpreted differently had the interview been carried out by a different person? These were some

of the underlying questions asked and reflected throughout the data collection process. The interview sessions had their moments of triumph and awkwardness. The feeling of triumph was felt when the interview sessions blended well with the interviewer-interviewee connection, so much so that the data reverberated power, and was bursting to be analysed and interpreted. It felt as if the data just resonates with richness, depth and robustness.

On the other hand, a feeling of awkwardness emerged when the participants withdraw from in-depth discussions, appear reluctant and disengage themselves from the interview process, for reasons known only to the participants. In those instances, it felt as if the interview was cumbersome, as reflected in their tone of voice, facial and bodily expressions. Those moments affected the confidence of the interviewer, and it happened to me on two occasions where, although sufficient data was collected, there was no warmth or depth to the interview and I felt disconcerted. Brinkmann and Kvale (2015) state that interviewing people from different continents and cultures require different ways of interaction. As most interviewees are strangers, care should be given when asking direct and probing questions, and when sensitive subjects are involved. Adopting the right approach often set the tone for a mutually beneficial relationship between the interviewer and the interviewee.

The transcription process was a great learning experience. It focused and sharpened the interviewer's skills on the details, language used, tone, pauses, and queues. The task required the researcher to be attentive and sensitive to what was verbalised and not verbalised. One would think that, at the doctoral level, language and dictation skills could be mastered instantaneously, but the transcription process revealed otherwise. Transcription work was new, alien, tedious and challenging. In the beginning, the experience was frustrating, overwhelming and not easy to like. The experience was similar to Meyer and Land's (2006) description of troublesome knowledge. Nevertheless, over time, the practice of transcription created a sense of familiarity that was only accustomed to the transcriber, and, when repeated, the practice and process became straightforward, swift and easy. The development of the skill is similar to Dreyfus' (2004) claim that, when skills are repeated over time, they become better and one progresses within five stages of skills acquisition (novice, advanced beginner, competence, proficient and expert). As a novice who lacked the skill at capturing the audio conversation, I found that the speed of completing the transcription was slow and presented many inaccuracies. However, the repeated cycle in time broke the threshold, creating better insights, sensitiveness, and finesse with which to apprehend words more accurately. Experiencing

troublesome knowledge and crossing the threshold is said to be transformative, integrative, irreversible, bounded and troublesome (McKenna, 2017), a description that matches the transcription experience. The primary challenge in transcription was understanding people who had strong dialects and staying focused beyond the 4-hour threshold. There were moments when personal conviction to complete a transcript pushed the researcher's limit beyond the 4-hour threshold, leading to many inaccuracies and physical tiredness. Correcting those inaccuracies was time-consuming, and, in retrospect, it would have been better to do it right the first time. The lesson learnt from the transcription process was to respect the defined transcription time and to acknowledge the limitations of one's ability to focus. It is by acknowledging one's limitations that the experience becomes enjoyable, and the endeavour becomes more fruitful. The quality of the transcript is dependent on patience and perseverance. The key to this is being conscientious to words uttered and having the ability to put them in writing accurately. A maximum of two repeated playbacks was carried out to verify and validate the accuracy of the transcripts. In addition, the use of transcription protocols ensured professional presentation of the transcript, which, when read by anyone, reflects the effort and thoroughness invested in the transcript.

3.11. Being an insider researcher

In qualitative research, the researcher is considered the research instrument. Cresswell (2013) argues that, although researchers use a protocol, such as an instrument for collecting data, and follow a specific process, it remains that the researchers are the ones collecting the data. The quality of the data depends on the researcher's data collection skills and proficiency. The perspective of a qualitative researcher is a paradoxical one. On the one hand, the researcher must be in tune with the experiences and meaning defined by others, while at the same time being aware of their biases and preconceptions, and how such biases and preconceptions influence their attempt to understand the subject under study. A researcher has an intimate and direct role in the data collection and analysis processes. Whether exercising the role as an insider (sharing similar attributes), or as an outsider researcher, understanding the relationship and one's membership in the research environment is essential and serves as a constant factor in the investigation.

In the present study, the role of the researcher is one of an insider. An insider researcher is a person who is a part of the group being studied, through belongingness (Unluer, 2012). Although the advantages of being an insider researcher include a better understanding and relationship with those under study, it also presents challenges. Objectivity is the essence of qualitative research. Being an insider, however, may sometimes lead to the familiarity that may obstruct the purpose of objectivity. Failure to be objective may, in turn, lead to misinterpretation of data and situations because of the researcher's prior knowledge. Being an online doctoral student, the researcher is also undergoing her thesis preparation. The researcher, therefore, interacts with the same system, information, and people as experienced by the participants. This interaction and being in the same information environment present foundational familiarity, but a familiarity that is at the surface level. It provides for the understanding of the process, setting, participants, and an understanding of their interpretation, from strengths to weaknesses. The researcher, however, does not claim to know the depth of people's thoughts or how they perceive this environment. As a professional working in the computing and information science discipline, the researcher has views and a passion for information that is personal. How others view and experience information may not be comparable to that of the researcher.

Therefore, as an insider researcher, I found the position of duality a constant struggle between finding the balance as an insider and as a researcher. The strategy was to compile the data with an open mind and assume nothing in-depth is known yet, apart from what is common knowledge. Neutrality does not exist, and the researcher was careful not to make any assumptions while collecting data from the participants. Throughout the data collection process, the researcher was sensitive to personal biases. It was about knowing what to omit and what to accept, in order to remain objective. However, because of the shared familiarity between the researcher and the participants, in-depth probing was necessary to identify areas that were not thought of but experienced by the participants. Being an insider researcher has its advantages. Those at the decision-making positions granted immediate permission for the researcher to carry out the research and gave access to interview the doctoral students. The researcher's own position as a student expedited the data collection process. Being part of the student body meant, through engagements and interactions with other students and the thesis faculty members, a connection was established and this facilitated the participants' and thesis faculty members' recruitment. Although the first e-

mail invitation to participate did not generate sufficient responses, it was through this connection that more participants were recommended, invited, and selected.

The thesis faculty members' involvement in the data collection process provided an outsider's perspective. Due to their proximity to the students, the information they shared was valuable as it shed some light on what the students claimed and perceived to be true. Their experiences and stories were garnered from different angles. As thesis faculty members, their position exercises professional boundaries where the power relationship influenced the extent to which they share information. Preserving information sensitivity and exercising professional diplomacy were crucial elements in the thesis faculty members information sharing – a way to avoid being too critical of the organisation's system while giving enough data for the study. Their positionality is one of influence and persuasion. Although these were challenges faced by the researcher, the basics of good interviewing and communication still applied. One must be well prepared, focused, and learn as much as possible as they share their experiences about their thesis students' information behaviour and their thoughts on the current information support services.

The research topic granted an opportunity to understand the way students interact with information in the current setting. It has the potential to inform the current information support services of strategies that could enhance the current practices. As an insider and as a researcher, I found that any possible critical and unpalatable interpretations need to be presented with care. Proposed recommendations must be sustainable and viable so that they add value to the body of knowledge, to the community of practice, and improve the current information support services.

3.12. Ethical consideration

Ethics is the morality of human conduct (Miller et al., 2012). It refers to a researcher's moral deliberation, choice and accountability throughout the research process, from data collection, analysis and interpretation, to its presentation (Miller et al., 2012; Resnik, 2011). It is a central part of research as it establishes the rigour and trustworthiness of a research project. A researcher's decision-making on the research procedure and all ethical matters outline the conduct of the research (Rossman & Rallis, 2010). It is an ongoing moral consideration that demands iterative

reflection and action. Historical research practices involving living subjects have led to the development of ethical guidelines by which to conduct research (Miller et al., 2012) in order to protect research subjects against any form of exploitation. The practice was expanded further into various ethical guidelines established for different fields according to the nature of their discipline. In educational research, respect for the person, knowledge, democratic values, quality of research, and academic freedom formed the ethical guidelines framework (BERA, 2011). The framework decrees right to the participants through voluntary informed consent, openness and disclosure, right to withdraw, vulnerable participants, incentives, detriment arising from participation in research, and privacy (BERA, 2011).

The present research abides by the British Educational Research Association (BERA, 2011) and the university's ethical guidelines as pertain to a British HEI. Throughout the data collection process, every action and decision conformed to the ethical guidelines mentioned above. The researcher also took time to reflect on the whole data collection process with a critical mind, adhering to ethical guidelines. Upon ethical approval, an 'invitation to participate' e-mail was sent to prospective participants with full disclosure about the research and what their participation entails. Details were communicated through the participant information sheet and the participant consent form. Being transparent from the onset gave the participants the opportunity to make an informed decision before granting consent.

The design of the interview questions was also given due diligence, whereby critical friends were called upon to review and comment on each question to avoid leading or biased questions. The interview questions were reviewed twice (pre-revision and post-revision) to ensure the questions were valid and would serve the research objectives. During the data collection process, the participants were informed of their rights and were allowed to withdraw at any point should they wish to do so. The participants' privacy was respected, and before any recordings of the interview session, their consent was sought. Since the interviews were conducted online, the network's security and anonymity of the Internet presence were maintained through the use of a virtual private network (VPN), subscribed through IPVanish (IPVanish, 2017). The interview venue was a locked and secured location for privacy and peace so that no disturbances occurred or hindered the interview process. The interviews were recorded, and the files were kept in a password protected cloud computing storage space (Dropbox, 2017). This approach guaranteed that only the researcher has

access to the data. The researcher protected the identity of each participant by assigning a pseudonym to each of them. At the final stage, the researcher and the participants reviewed the transcript for accuracy. The final transcripts were uploaded to a secure online storage space (Dropbox, 2017) and backed up on a USB drive.

3.13. Validity and Reliability

Social science research commonly discusses the trustworthiness, strength, and transferability of knowledge to equate to the concepts of objectivity, reliability, validity, and generalisation (Brinkmann & Kvale, 2015). The issues of reliability and validity raise epistemological concerns about the objectivity of knowledge and the nature of qualitative research. While objectivity refers to the reliability of knowledge when checked and controlled, in qualitative research the way this is achieved is through reflexivity. Quantitative research emphasises results that are consistent over time (reliability), in which it measures what was intended to be measured (validity) (Denzin & Lincoln, 2018). Qualitative research disputes the generalisation of results and argues that human interpretations influence reality and its meaning.

The hallmark of qualitative research is highlighted in the construct of reflexivity that demonstrates a researcher's subjective contribution to the research process. This personal journey of the researcher provides the foundation and context in which the research is grounded. Validity depends on the extent to which a researcher provides sufficient details to enable the reader to interpret the meaning and context of the research (Popay et al., 1998); it thus depends on transparency in the way data was collected and analysed, and how it was related. The discussion on the data collection process was made clear through a step-by-step explanation, aided by the graphical representation of each step. Koch (1993) argues that a trustworthy research is one that provides detailed information and processes by which the result is reached. The discussion on research methodology, data collection and data analysis maintains this hallmark to achieve validity. In data analysis, Horsburgh (2003) and Popay et al. (1998) interpret subjective meaning through the use of participants' accounts to interpret data. Details on how this is adhered to are discussed in the data analysis section.

The study of information behaviour in this research is not concerned with whether the data speaks the truth, as it is relative, but whether it captured and understood what was said and interpreted at that specific point in time. To achieve this, the research process was reflected continuously. In the reflection process, the researcher self-questioned every aspect of selected concepts, the research process, decisions, behaviour, actions and reactions to ensure that they are in line with ethical practices and that they do not reflect personal bias. The purpose of the reflective practice is to ensure that the research reaches as near to objectivity as possible, bearing in mind that the truth may still be interpreted and defined differently by the reader.

3.14. Conclusion

In this chapter, the philosophical assumptions underlying the research methodology were discussed. This chapter also described and justified the methodology used in the research design, research instruments, construction of the interview questions, the sampling process, the data collection process, and the data analysis process. A summary of this chapter is presented in Table 3.3 to highlight the process and decision-making for this research project.

Table 3.2: Summary of the research design

Category	Decision-Making Selection
Ontology	Relativism with inductive reasoning
Epistemology	Interpretivism
Methodology	Qualitative
Research strategy	Single case study
Method	Semi-structured interview (purposive sampling)
Sample population and size	Online doctoral students (n = 14) Level 1 thesis faculty members (n = 4) Level 2 thesis faculty member (n = 1)
Analysis	Thematic analysis using Yin's 5 phases of analysis
Conceptual framework	Wilson's 1997 information behaviour conceptual framework

Chapter 4 : Findings

The scope of the finding's discussions in this chapter focuses on the following research questions.

- RQ1: How do doctoral students understand and interpret their information behaviour in an online learning environment?
- RQ2: How does doctoral students' information behaviour influence learning in an online learning environment?
- RQ3: How does information support services influence doctoral students' information behaviour and learning experiences?

The discussions in this chapter are divided into three major themes and ten sub-themes. The scope of the three major themes encompasses the discussion on the iterative process cycle of information behaviour, doctoral learners and learning, and the nature of doctoral-level information support services. The discussions (the context) in this chapter are a result of the person-in-context's (doctoral students) individuality, and doctoral-level learning in an online learning environment. These factors are the driving force that shape the students' information behaviour patterns. In the first major theme, the iterative process cycle of information behaviour details four cyclic components (information-need, information-seeking, information processing-and-use, and information-sharing) that complete the students' information behaviour. The second major theme on doctoral learners and learning discusses how the individuality of students influences their learning that leads to the transformation of 'self'. Finally, in the third major theme, information support services detail students' experience and views on the human and information systems support, about which ideas for improvements are also shared.

4.1. Getting to know the doctoral students (person-in-context)

In his conceptual framework, Wilson (1997) emphasises the importance of the person-in-context, arguing that the person's attributes (e.g., personality, character, psychological traits, demographics, learning styles) shape their information behaviour. Figure 4.1, below, provides a diagrammatic

overview of the online doctoral students (hereon called students) in this study (total students = 14; 13 females and 1 male).

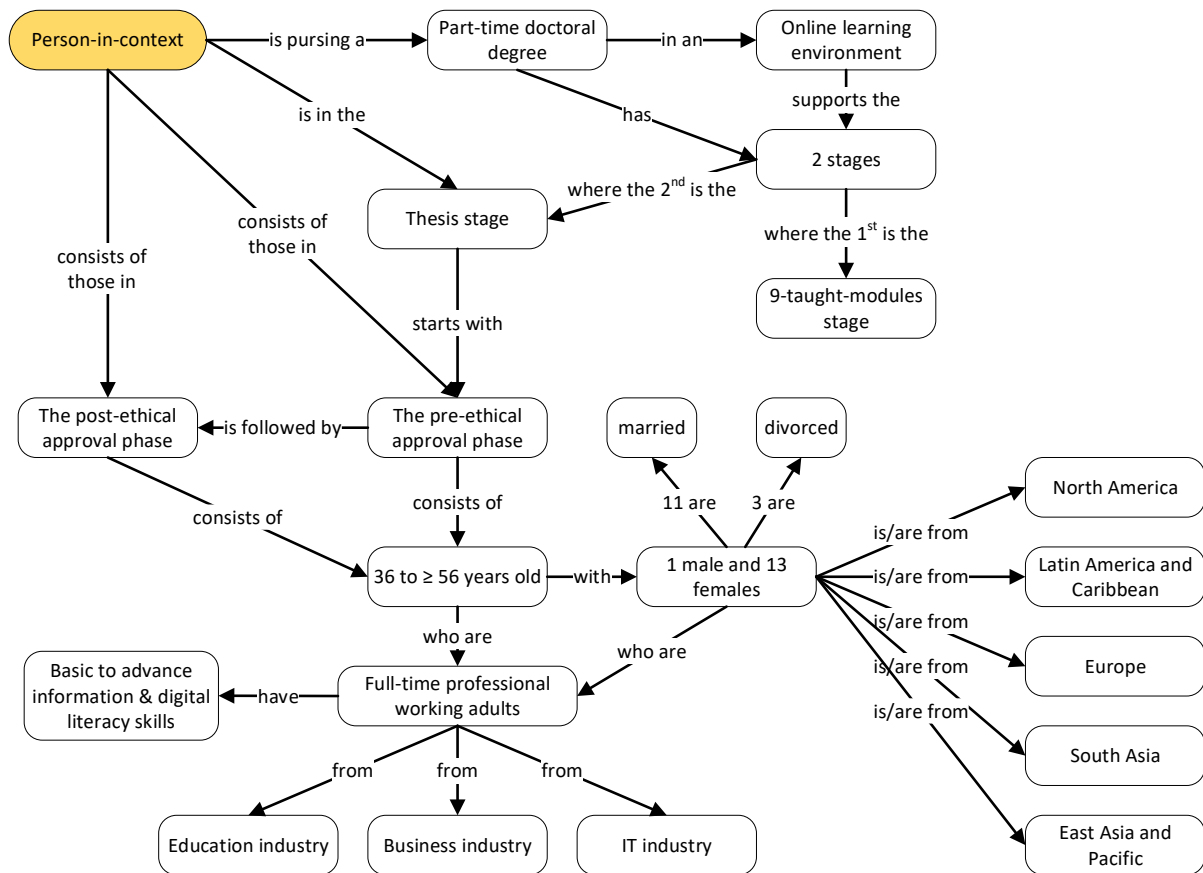


Figure 4.1: The backgrounds of the online doctoral students

The students in the thesis stage have all completed nine taught modules. The thesis stage is the second part of the doctoral programme. The students at the thesis stage were divided into two groups, where the pre-ethical approval phase is before ethics approval and the post-ethical approval phase is after ethics approval. Table 4.1 presents the activities in each phase.

Table 4.1: Activities of students in the pre-ethical and post-ethical approval phases

Thesis phase	Activity
Pre-ethical approval	Proposal writing and approval Ethics application preparation Data collection preparation
Post-ethical approval	Ethics approved Data collection Data analysis Thesis writing and submission

Figure 4.1 shows that the students are full-time professional adults who work in the education, business, and information technology fields. Their ages range from 36 to above 56 years old. All of them are parents who are either married or divorced. They are mature professionals residing in North America, Latin America and the Caribbean, Europe, South Asia, East Asia and the Pacific. They come from various cultural backgrounds with significant work experiences. They are professionals holding middle or top management positions within their organisations, holding operational and strategic management roles. They work full time and study part time (in the online doctoral programme). They have significant work, personal, and family commitments and responsibilities (critical factors influencing their learning), making the work-life balance a constant challenge. They describe their information and digital literacy skill levels as basic (n = 1), intermediate (n = 9) or advanced (n = 4), a factor that has a direct influence on their information behaviour.

The U.S. Department of Labor (2007) report categorises adult learners into 4 groups: 1) traditional, 2) minimally non-traditional, 3) moderately non-traditional and 4) highly non-traditional. The categorisation of these learners depends on the number of characteristics (as listed below) that they possess:

1. delayed enrolment in postsecondary education (beyond the first year after high school),
2. studies part-time,
3. financially independent,

4. works full-time,
5. has dependent(s) (other than a spouse),
6. is a single parent,
7. no high school diploma.

Based on the students' backgrounds and according to the above characteristics, the students in this study possess more than 4 characteristics listed above. The U.S. Department of Labor (2007) indicates that learners who possess more than 4 of the characteristics are categorised as non-traditional adult learners. Wilson (1997), Heinstrom (2002) and Miller (2002) posit that the internal and external attributes of people affect their attitudes, feelings, beliefs, interests, and expressions, which are often reflected in a person's intellect, understanding, thoughts, ideas and emotions (Bates, 2006, 2010).

The findings support Heinstrom (2002) and Miller's (2002) claim that the internal and external attributes of a person shape their information behaviour. Heinstrom (2002) argues that the personality and environment of students influence their information-seeking behaviour, while Miller (2002) suggests humans as the sole factor constructing meaning from information. As adult learners, the students had purposes for pursuing a doctorate that were specific, e.g., to boost their career, to gain credentials, to gain recognition, or for self-achievement and self-actualisation. They saw themselves as responsible, disciplined, well-organised, proactive, independent, determined, motivated, and inquisitive, all fitting the traits of adult learners (Malone, 2014). They each have a deep desire to learn new things and possess a clear concept of self. They therefore possess the capability to identify, search, use and share information to fulfil specific purposes. One of the traits that sets the students apart from younger learners is their tacit knowledge, i.e., the ability to apply knowledge, skills and abilities that reflect work and life experiences, thereby creating and applying intrinsic meaning from information. It is the kind of learning application that involves intuitive knowledge and 'know-how' ability that is deeply rooted in context, practice, experience and values – something that is hard to express but is deeply ingrained in their minds, as learners and practitioners. These qualities support the students' readiness to learn and succeed; the qualities and traits are compatible with adult learning principles (Knowles et al., 2015). The traits and qualities above reflect breadth and depth owing to the students' background. As such, the entirety of this study and the emerging themes discussed herein are based on the principle that individuality and

external influencers of the students shape their information behaviour, learning and experiences. Although their individuality presents personal uniqueness, their interaction with information within common contexts displays some common themes, which are discussed herein.

4.2. The iterative process in the cycle of information behaviour

The doctoral students' information behaviour is divided into several components: need, seeking, processing and use, and sharing. Findings suggest that the information behaviour process of the students is not linear, as depicted by Wilson's (1997) information behaviour conceptual framework, but is one that displays an iterative cycle until specific goals are met. The sub-sections below discuss how actions and decisions made under each component collectively contribute to fulfilling the doctoral students' information behaviour's overall goals.

4.2.1. Information needs

The information behaviour of doctoral students begins by identifying the need for information. Ajiboye and Tella (2007) postulate that the education level influences the amount of information needed to tackle the challenges presented at that learning level. In this case, learning at the doctoral level covers depth and breadth that challenges students' existing knowledge, skills, mental and emotional states. The thesis stage is a process that presents different goals at different times. Students' information need is not static but is formed by the progress in research and process, as supported by Chu and Law (2008). Their information need is driven by the need to close existing gaps in knowledge, skills, mental and emotion at different phases in the thesis stage. At the beginning phase, students' information need is to support fundamental information related to the process and structure, such as supervisor matching processes (the process of communicating and finalising a supervisor).

*'Well, it depends on your **intensity of where you're at and what you're doing at a particular time**. For example, in the **matching phase**, I knew that I would have been reading a lot about what is expected...'*
[Pst1]

They then proceeded to the proposal writing phase, wherein information on general research concepts was needed to complete the proposal. From then on, students proceeded to need information related to ethics, data collection, data analysis, academic writing and final presentation. Students' also needed information to meet specific criteria or requirements set by the programme or the thesis stage. Information on standards, policy, criteria, and processes was common information needed. See Table 4.2.

*'It's a bit more **streamlining** in terms of, **this is the exact the university is looking for** and so, let's focus on that. So **template** would definitely be a big thing **thesis structures, thesis proposal writing structure, what exactly is expected by this particular university.**' [Pre1]*

*'When I first started, I think I was looking for more **general thematic, philosophic papers** I mean, well, and of course our programme was set up like anyway, the very first was **more about higher education, and about professional doctorate, and about the future of education, and, and so on. And I've kind of enjoyed that. Just to get a real sense of the breadth** of it all.' [Pre5]*

Data suggest that students' information need covers gaps in four domains: 1) knowledge, 2) skills, 3) mental state and 4) emotion. Information that builds knowledge also develops skills, shapes thinking and boosts one's confidence level. Table 4.2, below, presents a complete list of information needed by the students. The information needed depended on the thesis progress timeline.

Table 4.2: Types of information needed by the doctoral students

Types of information needed	Quoted by
Thesis standards, criteria, requirements	Pre6, Pst4, Pst1, Pst3, Pst6, Pst7
Proposal structure	Pst3, Pst5, Pst6
Thesis structure	Pre1, Pre7, Pst1, Pst4, Pst6
Processes	Pre1, Pre2, Pre4, Pst1, Pst3, Pst4, Pst5, Pst6
Academic writing	Pre2, Pst7
General research concept	Pre5, Pst3
Educational discipline and research	Pre5, Pst5
Research design	Pre2, Pst5
Research ontology, epistemology and methodology	Pre6, Pst3

Specific theoretical framework	Pre6
Specific theories	Pst3
Data analysis	Pre2, Pst6
Research tools	Pre2
Specific research topic	Pre2, Pre3, Pre6, Pre7
Research presentation	Pst5

Students knew that the quality, content, and volume of information identified will influence their ability to finish tasks (Pre1), meet deadlines (Pre2), progress more quickly (Pre7) and complete their study (Pst6). Table 4.2, above, proves that students' information need is planned and decided according to their needs at different times in order to achieve specific goals.

*'For me it's the basic **completion of the assignments**, completion of the assignments, you know, the **completion of the work that's required**, and that's the main reason it's not anything else.'* [Pre1]

*'...I tend to be the person who **looks for information for a specific reason** you know, I'm **focused on my task**, so then I need information about you know, a **deadline** for example'* [Pre2]

While many needed information to serve present purposes, two students (Pre5, Pre6) identified information needs to fulfil their future research goals (planning ahead). While still in the early part of the thesis stage (at the pre-ethical approval stage), Pre5 needed information on the final presentation (viva voce). Pre6 needed in-depth information on the research methodology and theoretical framework to finalise her data collection strategies (carried out at the post-ethical approval stage). As the students progress, their information needs progress towards information that establishes in-depth knowledge on research concepts, practical skills, and research thinking.

*'So the trigger is **flushing out information for the thesis**, the final thesis; **prepare myself for the oral exam...**'* [Pre5]

*'So I'm looking for information that would **underpin my research and thinking**. So there's a lot of the work about sorting through that, and then the other is getting a sense of the **methodology** that I need to use that is sufficiently robust, to comply research requirements for doctoral level.'* [Pst3]

As discussed earlier, information was also required to fulfil psychological gaps (emotional and mental needs). Various information was identified and needed to support discussions in student-supervisor meetings (Pre3). The information identified would enrich discussions and raise critical questions for their research. Often, the conversations would entail questioning, constructive debates, arguments, rationalisations, and justifications (Pre2, Pre3, Pre7). Therefore, students' conscious or unconscious intention to learn and prepare (confidence to discuss and answer questions) for the meetings triggered their information need. The quote from Pre3 below suggests that prior feedback required preparation that will be fed into the next meeting where items discussed will be clarified and discussed to ensure progress is in line with the research goals.

*I've got some **feedback from my tutor**, they were going to **meet with me** via Skype. I needed to be prepared, so that was kind of the **intense, collecting information**, and again, after that **meeting**, when **points were clarified, discussed**, and it was just **more clear direction** that I was going in or to **move away** from a certain direction. I would **do a lot of research**, so, it's **around the time of the meeting** with my tutor." [Pre3]*

Another student (Pre2) equated her lack of information to an 'empty slate', and therefore identifying the right information would provide a 'clearer sense of what' is necessary for learning and research.

*"...I compare it to where I was, at when I started the whole programme and you know, I was very much kind of the **empty slate** taking whatever came at me and just kind of jumping in to that, now I think **I'm more discerning** you know, **I have a clearer sense of what I need to learn or need to know** at this point..." [Pre2]*

Students also needed information to streamline their thinking into research thinking. Having identified a different mindset from her supervisor and colleagues, Pst7 had to gather information that would help streamline her mindset to fit her research needs.

*'...I think my **mindset** on my topic **influence the information** I tried to **garner**. And sometimes my **mindset** is different from my supervisor's mindset or, from the mindset of my colleagues so, I had to **re-orient** my, or **review then my mindset**...' [Pst7]*

Students' information need at the doctoral level is more complex, owing to the students' context, level of awareness and personality (Heinstrom, 2002; Meyer, 2016; Wilson, 2000). Therefore, it is planned and purposeful. Wilson (1981) claims that information need is built from psychological, affective and cognitive needs, which may occur as a result of conscious or unconscious intention (Bitso, 2012). Conscious intention sees students plan and identify the information needed for their research. The unconscious intention is when supervisors act as a proxy and inform students of the information they need.

The extensiveness of information needed at the doctoral level is not determined by students alone, but involves others who are more experienced and knowledgeable to support students' information need. Information need is dynamic and depends on the students' knowledge (Chu & Law, 2008). As their intellect expands, their information need becomes more specific. They need to discern what, when and why information is required. Knowing how much is needed is '*hard to judge*' because it is about learning '*how deep and how far back*' one needs to go (Pst4). The process clouds judgement and causes anxiety.

*'I think the hard part sometimes is, you **read articles** and they're **incredible dense** and I cite, you know, 500 references that seem to go back and back and back in time and I think for me it's **hard to judge** sometimes, **how deep or how far back do I go**, given that this is a professional doctorate...'* [Pst4]

When the process becomes challenging, students identify colleagues, friends, peers and family who function as sources of information support (Pst1, Pst2 and Pre3). There were times when students were unaware of their own information needs. For example, when Fac1 identified a gap in students' information need (unaware state), he intervened and suggested various resources needed by students (Fac1).

*'...I'd say **they rarely ask**, and **they need to be told**. It becomes apparent that they don't know, when it becomes apparent that **they don't know**, I find myself telling them...'* [Fac1]

From the discussion above, students' information needs consist of 3 basic questions:

- 1) What information do I need?
- 2) When do I need the information?

3) How much information do I need to close the gaps?

These questions will continue to be asked until students can identify information that they think would close those existing gaps. While discerning how much information is needed, a back-and-forth movement between information need, information seeking and information processing takes place until specific goals are met. In the process of asking and answering the questions, students exercise ongoing cognitive processing that changes their emotions and perspectives. Once the information needs are finalised, students will proceed to seek the information.

4.2.2. Information seeking

Information seeking is carried out to fulfil the need to satisfy specific goals (Wilson, 2000a). Students' information-seeking activity involves the searching and transferring of information between information sources and the information user. The quality of information sources and resources within the information environment determines the effectiveness of the information-seeking activities. Students' information-seeking activities encompass human-to-system (primary source) and human-to-human (secondary source) interactions through internal and external sources. This is similar to Ahiauzu and Ani's (2015) study that confirms online and human sources rank the highest, as information sources. For students, information sources need to be '*accessible*' (Pre2, Pre4) and '*easy to use*' (Pre2).

Various internal and external sources were utilised to support students' information-seeking activities. As such, students' information-seeking activities involve active, passive and ongoing search, as highlighted in Wilson's (1997) framework. Table 4.3 summarises various sources used by the students.

Table 4.3: Doctoral students' internal and external information sources

Source	Category	Description	Quoted by
Internal	Online system	University library Students' support portal Doctoral community page University website	Pre1, Pre2, Pre3, Pre4, Pst3

Internal	People	Supervisor Faculty members Students Support personnel	Pre1, Pre2, Pre3, Pre4, Pst3
External	Online system	Google search engine Google Scholar Online forum Academic websites YouTube	Pre4, Pre7, Pst3
External	People	Colleagues Subject-matter experts Personal acquaintances Friends Family members	Pre2, Pre3, Pre4, Pst1, Pst2
External	Physical	Workplace library Public library	Pre2, Pre6, Pst2, Pst3

The thesis handbook served as the primary resource that contains all the essential information about the thesis stage (Pre1, Pre2, Pst4, Pst5, Pst6). As students' information need grew into research-based information, they expanded their resources to include books, journal articles, proposal samples and thesis samples (Pre1, Pst5).

Students' information-seeking process involved using pre-determined criteria to produce search results that are scholarly, relevant, authentic, and coherent (Pre1, Pre2, Pre4, Pre5, Pre6). For Pre2, information's relevance and accessibility are two determining factors that influenced her information seeking activity.

*'...I'm gonna find information about that, so, the processing involves that kind of **assessing for relevance**. I think the other piece is **accessibility** and that means **is it accessible** you know, in a format like either **online** or like I say, at the local library, or is it also **accessible** in term of, is it **written** in a way that's accessible, and, and **easy for me to use**.....it's not easy to sift out what applies to us and what doesn't apply to us, so, I am looking for **coherence in the information**...' [Pre2]*

Although the Internet is the best source for information, it poses risks to accessing quality and authentic information. Doctoral research requires access to reliable, trustworthy and verifiable information sources. One student (Pre5) displayed the presence of information literacy skills demonstrating sufficient ability to recognise and avoid bogus publications. Pre5 regarded reputable publishers and authors as authentic and quality information sources. The scenarios above suggest that students' information-seeking activity is planned, well thought out and involves cognitive planning and processing that involves tacit knowledge.

*'I suppose I have to **make an assumption** that the **scholarly information** available through the university **is peer reviewed**. Now that's not necessarily a good assumption of me but you know in my world, in the medical education world, particularly in [field of study] education, there's only a handful of journals that are peer reviewed ... that's always a big concern to me cause I look at the, generally **look at the authors in there, and their positions**, and if they're **from a big university**, I'd make a **general assumption** that they **must know what they're talking about** and then quickly look at the **methodology and laws** and they're **not published in some kind of a cult journal or something**. So, yeah, I believe, I think in assumption that there's good quality literature but, I don't, I've never been able to get a full handle.'*
[Pre5]

Although students identify their digital and information literacy skills as intermediate and advanced level, the majority use the basic search method. Only two students (Pre4, Pre5) used the advanced search method, which saves time and effort, as similarly claimed by Catalano (2013) and Vezzosi (2009). The advanced search was deemed useful because it resulted in more accurate, focused and relevant information to support the students' research needs. It also suggests improvement in students' search skills. Those who do not explore advanced search methods cite a lack of knowledge and time due to work and family commitments. Students' perception of their skill level to the method used suggests there is a gap in how they perceive their skills for what they do, as supported by Catalano's (2013) study, which is a potential area for future research. Each student displays varied behaviour in search method adoption, decision-making, perspectives, needs, action and reaction, where some demonstrate a higher level of information-seeking behaviour than others. This finding corroborates with Heinstrom's (2002) result in which personality (fast surfers, broad scanners and deep divers) influence information-seeking behaviour. It also supports Wilson's (1997) claim that the person-in-context displays individuality or personal traits in their information behaviour.

While active search is the main search method, students' interaction with information also leads to discovering new information through reference lists (the snowballing technique) or through serendipitous discovery experience (passive search). Barrett (2005) claims that information-seeking behaviour is an idiosyncratic process wherein students constantly read, dig, search and follow leads (in an ongoing search). The snowballing approach helped identify relevant literature from the list of references presented in journal articles (Pre3), while 'serendipitous discovery' was unplanned and led to discovering articles published by prominent authors (Pre5).

*'...I would have a **look at the list of papers**, and then kind of read through them, and then think, right, that one looks like it's got some really good information. I would **read through it and see any information** I could use from that, **that would then lead me on to others.**' [Pre3]*

*'I often have **serendipitous discovery** that I'm looking for something and then there'll be 150 references come up, and I go through every one quickly, and suddenly I find one I never even thought of, holy cow, it's completely different area, I didn't thought of before, so maybe I **probe that a little bit**. Or I might, there'll be a couple of **authors** that I've, may **have written prominent papers** [inaudible segment] in my field. So, I'd look for their **authorship.**' [Pre5]*

Students' personalities, traits and skills influence their information-seeking behaviour. Students who were successful in their information-seeking activity displayed traits that reflected determination, confidence, pragmatism, self-motivation and focus. The students included those who were 'go-getters' (Pst1) and focused on their information goals (Pst2). They knew what information is needed (Pre4, Pst2), where to locate the information (Pre4, Pre6, Pre7), and were skilful and comfortable searching for the information (Pre6, Pst5, Pst6).

*'I try to **focus**, I mean, what do I **want to do**, what is **my purpose**, why do I **need the information**, is it **relevant**, it's nice, I mean you can always read that later but I **try to stay focused.**' [Pst2]*

*'I have been participating in several research studies in [name of a country] over the past 8-10 years. Thus, I always use electronic database like EBSCO and internet searching in my workplace and daily life. So, I **do not have any difficulties in searching information** for the thesis.' [Pst6]*

As students go through the iterative cycle of information-seeking, their existing knowledge and skills change (Ahiauzu & Ani, 2015). They become more sensitive towards identifying and searching for information that is more focused and relevant. This indicates that their skills are elevated to a higher

level, a similar concept to Dreyfus' (2004) adult skill acquisition and Chu and Law's (2008) four stages of transitional phase. Students' traits (e.g., determination, confidence, pragmatism, self-motivation and focus), experience and prior knowledge determine the extent of students' information-seeking behaviour. As they engage in information-seeking activities, they gain more expertise and confidence in their ability to retrieve the needed information. According to Barrett (2005), in the beginning, the information search is generic but, as students gain more knowledge, skills and competencies, they become more focused.

Information-seeking actions that resulted in positive outcomes (information found) are associated with a sense of achievement, while negative outcomes (information not found) caused stress and frustration. Given the amount of information available and the complexity in the information landscape, it is normal for information users to experience anxiety and feel inadequate in seeking information. Those who face challenges blame their skills, lack of personal effort or personal efficiency, and lack of critical discernment. Some felt they have not adapted well to the information systems (Pst1, Pst5), and felt they lack IT and search skills (Pre3, Pst7).

*'...I'm not sure though, perhaps it's because of my, **how basic I am in terms of using technology**, I'm not sure that the, the library itself is as user-friendly as it should be...' [Pst7]*

*'...I feel particularly with my searching for stuff on, in the library, **I'm not that efficient at it**. I end up of trolling through masses and masses and masses of stuff, and I haven't, I'm **not entirely confident** that **I'm getting all the articles** that I need...' [Pst5]*

Some did not put more effort into exploring the available systems (Pst5, Pst7). Others felt they are too slow and lack the efficiency needed to search for information (Pre1, Pst5). Personal commitments and time factors also limited students' abilities to further explore information-seeking activities (Pre7, Pst1, Pst2). For Pst1, her information-seeking effort was only focused on getting '*just enough information*' to progress to the next task.

*'And so I will tell you quite honestly, at times I just want to just find just enough information cause I don't have the space sometimes to pack it in, **nor the time** as well to even go and search because of work related commitment and so on.'* [Pst1]

Failure to locate the necessary information from the online information systems caused emotional distress, feeling overwhelmed and frustrated (Pre4, Pre5). The volume of information available caused information overload (Pre2, Pre3, Pst1, Pst2). Pre3 faced difficulty sifting through specific information. The tedious process was seen as a setback that caused confusion and doubts that wasted student's time (Pre4).

*'...if you just type that in when you do Google search, oh my goodness, **the information that comes through**, so, **being able to sift through** the information, then focus what is on what you're particularly interested in, that I find initially very **difficult**...' [Pre3]*

*'Sometimes I think I suffer from **information overload**, especially when it came to finding research for the literature. And sometimes it seems that oh boy, **there's so much** information out there.'* [Pst1]

For example, Pre5 felt frustrated when his information-seeking activity using the university library faced technical difficulty. Access to technical support personnel to solve the issue was not immediately available (Pre5). When this happens, students' work is disrupted because access to an information source is denied. Such a scenario suggests that students' learning experience is directly affected by their information environment.

*'...I've had technical issues in getting into the library or in getting records or something. I find it a little **frustrating** because you can't actually get a person.'* [Pre5]

Since information-seeking at the doctoral level is complex, Kuhlthau (1989) notes that positive and negative emotions are a normal part of the process. Conway (2011) argues that the higher the level of information need, the more advanced are the IT skills required to complete the research. She claims that many graduates lack the necessary IT literacy skills to support their information-seeking activity. Al-Muomen et al. (2012) and Chu and Law's (2008) study show a similar pattern to the students in this study and argue that students need more instruction on specific search skills (advanced) to become more competent.

While others' experienced information overload, some students remained determined and focused, and continued exploring alternative online sources. The use of alternative sources produced the

intended search results (Pst1, Pst2). The scenario reflected a sense of accomplishment that resulted in satisfaction. However, if the effort failed to produce intended results, humans (e.g., a supervisor, other students, colleagues, or experts) became the next source of information. As with a previous study (George et al., 2006), students' information support includes human sources such as supervisors, faculty members, subject-matter experts, colleagues and other students. Such human sources provide valuable suggestions to information sources and resources while giving valuable advice, guidance and encouragement (Barrett, 2005). This indicates that students prefer and trust the information provided by authoritative, knowledgeable and experienced figures, similar to Catalano's (2013) finding. Other studies have also noted the important role played by academic staff or authoritative figures in information-seeking behaviour (Al-Muomen et al., 2012; Spezi, 2016; Vezzosi, 2009). Seeking information through others is what Davies (2013) and McKenzie (2003) call information-seeking through the proxy (gatekeepers, agents or intermediaries), i.e., people who support others' information needs – a component indicated in Wilson's (2006) earlier information behaviour conceptual framework called 'information exchange' (Wilson, 1981). Finally, if specific information is still not found, the information search activity is ceased, and alternative resources (closest to relevance) are used as a coping strategy (Pst2).

*'Sometimes **you can't find the articles** for example, or sometimes there may be, I don't know, I mean sometimes I can't find the particular article I'm looking but you know **I stopped chasing that, I look for something I don't get stuck in...**' [Pst2]*

Students' information-seeking process was cumulative, growing in proportion to the thesis timeline. Different information was sought at different points in order to serve different tasks (Pst5). Identifying the right information to fit the information need for different tasks was time-consuming and never-ending (Pre1, Pre3). As a coping mechanism, students identified a saturation point that allowed them to slow down in their information-seeking activity and reach a stopping point. The factors in determining the saturation point depended entirely on the students. There was no one common factor for determining the saturation point, but several, including wanting to start the next task and progress to the next stage (Pre2), not wanting to repeat the process (Pre5), getting tired of the process (Pst2), using others to confirm information sufficiency (Pst4), and finding the same information repeatedly (Pst5).

*'I'm pragmatic I think as I've gone along, gone through the process in terms of **okay, it's time to get this done ... and so I do less of exploring**, you know, exploring every path that's possible and **I do more of finding** the information I need **to do the next task.**' [Pre2]*

*'...I feel a little bit like I'm very new at all of this, and so I **don't have a lot of confidence** at what I'm **looking at is everything I need** to look at. So I guess I'd **try and look at a lot**, just to make sure what I'm trying to do is almost like get to the point where I'm going round in a circle and it is starting to repeat. But you know you're **starting to find the same stuff**, so that kind of gives me a bit more confidence that I'm on the right track...' [Pst5]*

Information-seeking activities produce a massive amount of information resources that need to be processed to ascertain their relevance in fulfilling students' information need. The next section discusses information processing and use as the final step of information behaviour.

4.2.3. Information processing and use

Information-processing is the transition between information-seeking and information-use (Wilson, 1981), which involves extensive cognitive processing. The information-seeking activities can produce 'a lot' of information that can be 'overwhelming' (Pst1). Although Wilson (1981) claims that information processing happens at the cognitive level and cannot be observed, students at the doctoral level can ascertain the steps or methods they take to filter and decide on the relevance of information. Their information processing activities utilise research goals, criteria and requirements (identified during information need activity) to ascertain the relevance of information. Depending on the intent and purpose of the information, the requirements differed amongst students. The information processing (filtering) activity often matches the information found with students' research topic, relevance, existing framework, questions, and goals (Pre2, Pre3, Pre4, Pre5, Pre6, Pst1, Pst4).

*'So, if I find something now I should technically, in theory I would independently **evaluate that information** and **for its fit**. But I will generally **spot** what I'm **looking for** and selectively take stuff and put it into the **framework** that I've already **developed**...' [Pre5]*

*'Well, I usually **keep my topic and my research questions in mind** and as I go through the data that I'm given or that I locate, I try to **match them** with you know, my **research question** as I go along the whole **purpose of my research**. Cause as I said I can easily get overwhelmed with a lot of information that is out there.'* [Pst1]

Students applied some form of a filtering process to determine the relevance of the information to their research. Students' information processing was pragmatic (Pre2), focused but difficult at the same time (Pre3), categorical (Pst3), and involved a step-by-step activity. They start by sifting through the information (Pre3) and reading the content to ascertain the *'initial sense'* of information relevance (Pre2) – e.g., finding a fit in the existing framework (Pre5) or research methodology (Pre6). For Pre7 and Pst5, sifting through information meant skim reading the abstract, keywords, and conclusion to determine and digest its content. If the content is interesting and matches students' research interest (Pre2, Pre3), the information will be marked, flagged (Pre6), and highlighted (Pst3). The information will then be retrieved, categorised and kept in different folders for use (Pst3, Pst5, Pst6). Information processing not only involves the use of cognitive processing but is supported by students' discernment and intuition, described as *'speaking my language'*, *'get that initial sense'* (Pre2) or *'being a little ruthless'* (Pst5) in identifying relevant information, or *'don't feel like it connects to what I'm doing'* (Pst5) for irrelevant information. Students display a sense of connection and personal relationship to information.

*'...I don't know if you've had this experience, sometimes you find the resource and it says my gosh, there're **speaking my language** and it fits into what I'm trying to do here, and so, I, you know, it's quite **exciting** when you find those, that information.'* [Pre2]

*'So, it's really just **skimming** and **making a decision** and I think **being a little ruthless** and saying well, I've got, **I can't have everything**, I can't keep everything so I need to actually just **discard anything** that I **don't feel like it connects with what I'm doing**.'* [Pst5]

Processing the relevance of information also meant accepting and using information that is provided by current or contemporary sources and articulated *'in a robust way'* (Pst4). Since higher education is a new learning discipline for Pst4, she needed to use information that could confirm her thinking and is flexible enough for scrutiny, a requirement that is very subjective and difficult to determine.

*'I think I'd look for information that perhaps concerns the **ideas that I have**, and that is from what seems to be the **current sources**, and, **contemporary sources**, and **easily articulated in a robust way** ... For somebody such as myself who has none of that, each subject was a **new learning area**. ... So, I'm looking for **information that confirms what I'm thinking**, and that is, looks as though would be **robust** enough to stand up to scrutiny.'* [Pst4]

The decision to ascertain the relevance and usefulness of information is not as straightforward as applying criteria. Students' confidence level also affected their decision-making in determining the suitability of the information. Those with a higher confidence level knew how to apply systematic information processing (filtering) techniques (Pre5, Pre7), while others felt the masses of available information made it difficult to filter and decide (Pre3, Pst2). The filtering process depends on personal preferences and needs, as it involves reading, questioning, thinking and deciding (personalised actions). For example, Pre7 adopted the skim reading (abstract, keywords, and conclusion) technique to ascertain information relevance and considered it a personal preference.

*'...I normally, for example, if I find an academic paper that has a title that kind of lands itself towards my thesis topic, I'll **skim through the abstract** and the **keywords** and then I will go to the **conclusion**, read the conclusion. And from that, I will **think**. "is this paper going to help me", and if I **determine** that it is, I will then **digest** the paper. If the abstract, the keywords and the conclusion are **leading**, not necessarily the results but, but they are not **focusing** on the area that I need, then I will say, "thank you very much", and I'll discard it, cause I'll, or put it in the pile of "read when I have time" and, and that's how I generally **process what I need**.' [Pre7]*

Generally, the students are the primary decision-makers in determining relevant information. Other times, supervisors acted as secondary decision-makers, functioning as experts in judging the information's relevance and usefulness. Pre3 (a student at the pre-ethical approval stage) could never ascertain if the information she found was right for her research unless she confirmed it with her supervisor (authoritative figure). For Pre3, processing information to ascertain relevance for research was '*difficult*' because acquiring new knowledge at the thesis stage was regarded as the '*real unknown*'.

*'You know honestly I get information and I **never know whether it's the right information unless I speak to my tutor** and it's because this thesis stage is a real unknown, and because again it is, we're trying to get new knowledge, there isn't one formula.'* [Pre3]

Pre5, on the other hand, assumed that the information provided by the university was generally trustworthy, scholarly, and peer reviewed. Although the assumption provided some level of assurance and helped in determining relevant and useful information, it may pose some risk. There

is no certainty that information provided by the university is authentic, trustworthy or peer reviewed because the quality depends on the quality of publishers and that of the database subscription.

*'I suppose I have to make an assumption that the **scholarly information** available through the university is **peer reviewed**...'* [Pre5]

During information processing, if the information found does not fulfil students' research or information goals, students create a new information need. In Wilson's (1997) framework, information processing and use are regarded as one component, suggesting that the information found is always relevant and can be used. However, findings reveal otherwise. Between information processing and information use, a decision-making mechanism takes place wherein students determine if the information found is relevant or irrelevant to their intended goals. Relevant information is used to solve problems, answer questions, make decisions, negotiate a position or make sense of a situation, as also claimed by Kari (2010) and Jia et al. (2013). Irrelevant information is often discarded and ignored (Pre2, Pre6, Pre7, Pst5).

*'If the abstract, the keywords and the conclusion are leading, not necessarily the results but they are **not focusing on the area that I need**, then I will say, "thank you very much", and **I'll discard it**, or put it in the pile of "read when I have time"...' [Pre7]*

Although irrelevant information may not have a direct influence on students' research work, some students claim it still contributes to new knowledge, skills and perspectives. For example, students learnt new academic writing styles, were introduced to new vocabulary, developed thinking (Pre7), broadened their learning scope (Pst1), added knowledge, and provided insights and alternative views (Pst1). Students felt it was never a waste of time (Pre7, Pst1).

*'...I think a lot of the information, after finally I've narrow down to what I really wanted to do, a lot of the information will not be relevant, however, it has **broaden my scope** in learning about education in general, teaching teachers, and also more information about teacher educators, even though it does not necessarily relate to my area of focus. **I don't think it's time wasted**, really, but I think the information, I still have them stored because I know at some point **I'll be going back** to that bit of information to perhaps **use in another form** at another time for another purpose.'* [Pst1]

Finally, if information needed could not be found, students resort to alternative information (coping mechanism) to fulfil their information needs – a situation Spink and Prabha (2007) call satisficing (an alternative approach or good-enough solution). Using alternative information is also influenced by students' lack of time. The trigger for the decision-making is to move on and progress to the next stage, even though more information might be available. Whether information satisfies or does not satisfy students' information needs, at some point it may be useful to others due to its potential and relevance (Wilson, 1981). When this happens, students often share the information. When students use or share information (interaction with information and other people), they experience in-depth learning that changes their knowledge, skills, mental and emotional structure. Due to the extensiveness of the information-use outcome, a separate section (see section 4.3) on learning is dedicated to this discussion (the nature of doctoral learning).

In general, students repeat the information behaviour process cycle until their research and information goals are met. Through the cyclic process, students learn and experience a change in self that is new and irreversible.

4.2.4. Information sharing and the socialness of information behaviour

'Human presence' is a permanent fixture in the students' information behaviour process cycle, owing to the nature of doctoral learning and the online learning environment. As highly non-traditional adult learners pursuing a doctorate in an online learning environment, the students have information behaviour that is not isolated but involves interactions with people within their networks. The online learning environment simplifies human-information interactions, making information behaviour a collaborative effort instead of an individual one. Data provided evidence that information-sharing exists among doctoral students. Students interacted with various parties online or in-person to seek information, advice, tutorial, coaching and guidance. Table 4.4, below, summarises the people that provided such support. The type of people with whom the students interacted suggests that there is a fundamental relationship, trust, respect, and mutual understanding between them.

Table 4.4: The people who provided learning support to students

Category	Sample quote	Quoted by
Supervisor	<i>'...the supervisors have also been supportive in providing me, providing us with relevant resources, of the library cause we may, there are times when my supervisor in particular will provide other resources that you may not even think about...' [Pst7]</i>	Pre3, Pre6, Pst1, Pst5, Pst7
Faculty members	<i>'I spoke to some of our tutors, particularly I think it was [tutor's name] is his last name, and I so appreciated that sometimes he posted the journal, posted the article and you didn't spend an hour in trying to find the article whereas other tutors felt "oh, go and find it' [Pre1]</i>	Pre1
Students	<i>'...I would say just recently, I think, almost close to my ethical clearance, I was able to get in contact with 2 other colleagues (students) from [university's name] who are also in the thesis stage (laugh). So, we were able to meet and had such a nice meeting...' [Pst3]</i>	Pre2, Pre7, Pst3, Pst5
Colleagues	<i>'...we have a full department of social scientist in the college where I work, so it's true I have been asking some of them about you know, how to design interviews.' [Pre2]</i>	Pre2, Pre6, Pst3, Pst6, Pst7
Subject-matter experts	<i>'... I've actually reached out to the actual authors of papers and always had a good response from that. I've talked to the author of the DREAM instrument in Scotland. I've talked to a guy in Montreal, who discover, who came up with another instrument...' [Pre5]</i>	Pre5, Pst3, Pst6

Friends	<i>'Quite recently I came across a lot of information. Well, it was a friend who pointed me to a particular author...'</i> [Pst1]	Pre2, Pre3, Pst1
Family member	<i>'...the initial stages of writing the proposal, I would speak to people, friends, family...'</i> [Pre3]	Pre3

The information and communication technology (ICT) functioned as students' primary platform from which to interact with others. E-mail, WhatsApp, Skype, and other communication systems provided by the university were primary communication resources (Pre2, Pst1, Pst6).

*'Yes I think I do ask, get information from, I do share I get with other members of the, my cohort probably, mostly through the **WhatsApp** groups and the little bit through e-mail...'* [Pre2]

*'...I prefer to chat with people who I am familiar with via **e-mail** or **Skype**...'* [Pst6]

Also, face-to-face meetings (self-initiated and workplace dinner gatherings) and annual on-campus residency were considered precious moments of interactions (Pre2, Pre3, Pre6, Pst3). The residency supported the exchange of information, ideas, opinions and expertise through one-to-one and group interactions. Students initiated voluntary tutorial and coaching sessions to demonstrate the use of various research tools (referencing and data analysis) such as Mendeley and NVivo (Pre2, Pre6, Pst3). Besides the residency, students independently organised face-to-face meetings with other students in their country of residence. The sessions were '*very nice support*' systems that promoted in-depth discussion, information sharing, and personal support (Pre3, Pst3).

*'...I think in the **resources** that I got from **residency** as well, has also been very good. The information that you know, the **sharing**, like even **between colleagues** like [student's name], I mean [student's name] taught us about the Mendeley, I mean it's so good, I mean, Mendeley I still use it, I mean I learnt, although after [student's name] taught me, it took me a bit of figuring out but it's been a **very useful guide** and I'm looking forward to also **using NVivo** that [student's name] **taught me** and I think all the **sharing** that you hear, at least if not anything, because I've moved into that next stage, but it has really helped **motivate** and also understand what is the concept that are there in order for you to **finish the thesis**.' [Pre6]*

*'...I thought let me **organise a little meet-up group** so we can all meet up. If, for one month in [city name], and we'll just share you know, experiences really, and then the following month we meet in [city name], and anybody, it could be Masters, doctoral students, anybody, so, I did that last month, and it, that was an eye opening, there were only **three of us**, all at the doctoral at the thesis stage, and we **had pretty similar experiences** which I found **interesting**...' [Pre3]*

When students interact with others, they receive, interpret, use and create information on their own – knowledge that is uniquely shaped to suit their needs. The scenario is similar to Karunakaran et al.'s (2013) study on collaborative information behaviour, wherein people within the same context understand and form information needs through shared representations. Students in the programme come from different backgrounds and exposures, presenting different levels of understanding, learning and progress. Within the diverse learning community, support is provided and received whenever needed. In Bao and Bouthillier's (2007) study, they claim that people engage in information-sharing activities when they can benefit from it or when they share a common interest. Students who engaged in information-sharing felt a '*sense of collegiality*' (Pst5). The interaction showcased by students also displayed human kindness that aimed at supporting others who may not be aware of available information (Pst6) or who may not be going in the '*right direction*' (Pst7). The interaction sessions promoted learning where students with '*similar experiences*' (Pre3) compared and exchanged notes. The scenario experienced by the students is what Talja (2002) calls information-giving, in which students help other students to succeed in learning. Similarly, Brown's (2019) study on doctoral students suggest four types of collegial practices: intellectual, professional, social and emotional. She claims that, through collegial practice, students' learning interaction is purposeful and professionally driven, displaying patterns similar to those demonstrated by the doctoral students in this study.

*'I think that possibly the greatest value I get from the sharing of information is not the information itself but the confidence that others too are in the same position as me and don't always know how to approach tasks. So, it is more the **sense of collegiality** that comes from sharing the information than the information itself.'* [Pst5]

Information sharing provided strong learning support to students with quick responses to queries (Pre1, Pre3, Pst5). Those active in information sharing often receive instant or quick information, replies, and answers through WhatsApp, e-mail or in person (meeting and residency). Students claimed the rich information expanded their understanding of research and its process (Pre2) and built skills in using research tools (Pre6).

*'I think the new **WhatsApp group** is accessible, **user friendly** and we are **attached to our phones these days** which makes it easier to get a question answered quickly.'* [Pre3]

For Pre5, interactions with subject-matter experts felt real. The people he interacted with functioned as '*surrogate teachers*' and helped refine his questionnaire. For Pre6, information sharing helped her identify people with a common understanding that contributed to additional knowledge acquisition. It also provided some level of comfort in knowing that they share common knowledge and that conversations did not have to '*start from scratch*'. Pre5 and Pst1 saw information sharing sessions as a mechanism by which to establish human contact and eliminate isolation in their research journey.

*'...I've got really supportive comm (word incomplete), **help from all 3 of those**, they all 3 sent me **information, questionnaires** that I couldn't find online anywhere they wished me luck, you know, "please contact me if you need any extra help", and it was just instant, I mean, there was no hesitation, and, "who are you, what do you want it for?", nothing like that. **Great sharing and great support** and I almost felt that they were kind of like **surrogate teachers** for me and again it **felt connected** cause there's finally a person that got this stuff that was real, and that was helpful.'* [Pre5]

*'...I think it makes it more **comfortable** because you know that **you're talking to people**, you **don't have to start from the scratch** because you can just, ah, just in that article do you remember they were talking...'* [Pre6]

Students who engage in information-sharing activities experience positive emotions that help them acquire varied perspectives and understanding. The information-sharing atmosphere and interactions were described as '*joyful*' (Pre3), '*comfortable*' (Pre6) and '*interesting*' (Pre3). Speaking to others encouraged reflection, helped clarify questions and provoked further research reflection

(Pst3). It also functioned as a safe place in which to express struggles (Pre3). For Pre3, talking to others helped identify *'deeper approaches to teaching and learning'* and provided *'perspectives of different ones'*. Through information sharing activities, Pst7 participated in research collaboration with her colleagues, an experience that added knowledge and was considered *'worthwhile'*. The scenario is similar to that of Talja's (2002) study that claims information-sharing builds relationships and strengthens the learning community (social ties).

*'It has helped me to **reflect** and go **deeper** into the topic. I find that **as I talk about it**, it **clarifies** it further in my own mind. Some of our **discussions** have **provoked further research and reflection.**' [Pst3]*

*'...when I share that information with my colleagues and we **collaborate** together, and you know, this is probably how it should be, what have you, then at least it clarifies in my mind, yes, this is a **worthwhile research**, that I'm doing, and I will be able then to **add to the knowledge** that's there...' [Pst7]*

For Pre6, when knowledge was shared, discussed and summarised, the activities iterate analysis and thinking, hence, reinforcing learning. The information-sharing activities provided tremendous support to students. Through sharing, Pre6 discovered the existence of the reference management software, such as Mendeley and a qualitative analysis program called Nvivo, tools she never knew existed.

*'...**reading**, you get the **knowledge** and, or you get the **information** but I think **when you pass on** or you **discuss** about it, passing on could also be a **discussion**, it is actually **iterating** and also you sort of **analyse** that **information** a bit more I think, when you're talking about it, or when you are say like for instance if I share with you and then I'm discussing with you, I think I tend to analyse it a little bit more and then you know, I think also when you're sharing. You're going to **summarise** it or you're going to, what can I say, it's like when you teach, you're sort of **reinforcing** your **learning** of that.' [Pre6]*

*'...I'll tell you this because [student's name] **helped me** a lot with this but sometimes I **found missing in the information** is some very practical tools like [person's name] the one who **shared with us Mendeley** for example, right? Like at the **residency**, which has been **incredibly helpful resource**, but I didn't see that, but that was coming because [student's name] took the **initiative** right? So, sometimes I don't see a clear trajectory to help you know, helping us, connect us to some of the very **practical resources.**' [Pre6]*

Students also claimed that information sharing activities enhanced their *'thought-process and dialogic growth'* (Pst2), added *'different perspectives'* (Pst2, Pst3), helped reflect and formulate

research questions, helped identify '*approaches to teaching and learning*' (Pst3), promoted deeper reflection, and crystallised research theory (Pst3).

*'When I do talk about these **enhances the thought process and dialogic growth** construction of understanding and adding a different **perspective**. Asking answering questions certainly help like we used to do in forum platforms.'* [Pst2]

While the majority of the students engaged in and benefitted from information sharing, five students did not participate in the activity. These students felt they did not '*benefit from it*' (Pre3) or did not explore the opportunities or '*tap into them*' (Pre7). Others thought they were not '*expected to contribute*' and that '*it isn't part of the requirements*' (Pre3) and preferred others to share (Pre1). For Pre6, personal commitments and lack of time prevented her from engaging in information-sharing activities

*'...to be honest, if **I'm not expected to contribute** and I don't feel that I benefit from it, then I have not participated. It's a very selfish attitude I think **but I would like to contribute more in order to get something back** but I don't need to contribute, I don't, it **isn't part of the requirements...**'* [Pre3]

The discussion above demonstrates that socialness and information-sharing are integral aspects of students' information behaviour, components not indicated in Wilson's (1997) conceptual framework. Wilson's (1997) framework, amongst many, focuses on individual information behaviour activities and does not consider the social aspects of information interactions nor the context of the information users (Aydin, 2017). The presence of socialness and information-sharing implies that a new information behaviour conceptual framework is needed.

4.3. Doctoral learners and learning

Section 4.2. indicates that learning is present at every stage of students' information behaviour. Each of the information behaviour activities (need, seeking, processing, use, and sharing) revealed different cognitive processing levels that promoted learning. What is evident is that, when students complete the information behaviour process cycle and learn, they assume a new structure of the

'self', in which their knowledge, skills, mental and emotional structures change and continue to evolve. This section argues that students' learning at the doctoral level takes them out of their comfort zone (current state) and into a new zone where they experience internal learning battles through troublesome knowledge and crossing the learning threshold. As a result, students experience paradigm shifts (transformative learning) and finally gain self-authorship.

4.3.1. The doctoral student's individuality and traits

Learning style is significantly influenced by the individuals, in this case, the person-in-context. Students' individuality represents who they are, what they expect and need, how they decide, and how they take actions. As working professionals and highly non-traditional adult learners, the students demonstrate maturity in thinking, reasoning and decision-making in learning, setting them apart from traditional or younger learners. As mature professionals, the students were aware of their learning traits and acknowledged that they are important to succeed in doctoral learning. Students understood that they must be responsible, disciplined, well-organised, proactive, independent, determined, motivated, inquisitive, and have a deep desire to learn new things (Pre3, Pre5, Pre7, Pst1, Pst2, Pst6). The traits of a doctoral student are, '*you got to be a reader*', '*go-getter*' and an explorer (Pst1). For students, determination and motivation will help them gain sufficient information to succeed (Pre3). Quitting was never an option and students were resolved in their mind to see '*the light at the end of the tunnel*' (Pst7). Personal discipline, having the '*appetite for learning*' and for '*learning new things*' were all motivational factors that inspired students to think of their future, post-doctorate (Pre7).

*'...I'm not a quitter, I'm not a quitter. So, I have **resolved in my mind** I will not be a part of the statistics where you know you, go through the rigours of the modules and stuff and then, at the end here now when you're beginning to see the light at the end of the tunnel, you just drop out.'* [Pst7]

*'I've always had an **appetite for learning** and **learning new things** but I never considered the depth of knowledge that's out there until you try and, and follow a doctoral programme and it's **given me a desire** to in some way, but it will be very minor, to continue that learning post-doctoral studies...'* [Pre7]

The students possess different learning preferences. Although most demonstrated socialness in learning (interaction with others), some prefer solitary learning. Pre5 viewed himself as '*a self-*

learner, a lifelong learner, a self-motivated learner' where 'solitary' learning was his comfort zone in which to 'perform and practice' research. The identity of a 'single learner' or 'solo learner' sat well in his learning spectrum because he was 'free to set' his 'parameters'. Pre5's situation suggests that the students are mature enough to identify their comfort zone in learning. They possess independent views about their learning and do not need to adapt to the learning styles of others. They possess their own learning identity that is unique and that works best for their doctoral study. Pre5's learning in solitary suggests that, although the doctoral information environment presented aspects of 'socialness', the student's journey in completing their thesis is a solo journey. The scenario bears moments of silence between the researcher and his/her research, deep in thoughts and discovery, and reflected in the best form possible in the thesis.

*'...I've always been a **self-learner**, a **lifelong learner**, a **self-motivated learner** and so I'm kind of suited for this kind of track where I'm kind of a bit **free to set my own parameters**.' [Pre5]*

*'...I've been quite **solitary** on this, not necessarily a good thing but it's just the way I perform and practice and, I've always been kind of a **single learner**, a **solo learner**.' [Pre5]*

The depth of learning and the amount of information gathered in the doctoral study meant students needed to be organised and disciplined in the way they manage information (Pre5). Students did not need anyone to guide them, push them or remind them of their responsibilities. For Pst2, self-organisation has a direct relationship with her personality and growth.

*'...I'm a **motivated person**, and I don't know, I **don't need somebody else to guide me**, or push me, or anything, remind me of my responsibilities, I'm **responsible**, I'm very **organised**, so all these helped. I think there is a direct relationship with my **personality** and **my growth**.' [Pst2]*

Pst6 considered self-initiative as 'a very important element in one's learning' and success. For her, the Internet provides information that answers questions, solves problems, widens horizons, promotes discovery, adds new knowledge and improves work and live performance. She considered the 'discovery of new knowledge' as 'joyful'. For mature professionals, learning creates meaning and serves many purposes.

'Self-initiative is a very important element in one's learning and her/his success. Nowadays, the Internet provides easy access for us to find out the answers. Why don't we make use of it to learn more? It can help us to solve the problems in short period of time. Widen our horizons, learn things in more detail and perform better in career and daily life. To me, the discovery of new knowledge is so joyful!' [Pst6]

For Pre7, organising and managing time and commitments were part of the learning process (Pre7). Part of the strategy is to write 'something every day' and build the 'momentum' (Pst1) that guarantees progress and completion. While knowledge and skills are important elements in learning, students must also employ effective learning strategies that are structured and well-planned to ensure they progress and complete the doctoral study.

'...you really need to, to be able to manage your time with your commitments and this and that, and it's all part of the learning process...' [Pre7]

For mature adults, learning brings pleasure when new knowledge and insights provide opportunities for exploration. The traits and learning discussed above are similar to those of adult learners (Malone, 2014) and adult learning principles (Knowles et al., 2015).

4.3.2. The nature of doctoral learning

Learning at the doctoral level is complex and involves theories related to troublesome knowledge, threshold concepts, constructivism, transformative learning and motivation to learning. Doctoral students are learners who enter the programme with significant knowledge and experience. As such, their learning shifts from the acquisition of content knowledge to applied research that combines existing expertise and scholarly engagement. The nature of this type of learning creates a unique community of scholarly learners – those who capitalise on their knowledge, strengths, and passion to learn. Findings reveal that doctoral learning is complex because it involves multiple layers of learning and re-learning. Students' learning encompasses exploration, analysis, discovery, articulation, synthesis, critical discussions, process-driven actions, internal reflection and practical adoption. Doctoral learning is an 'ongoing', 'exploratory', 'iterative', and cumulative process (Pst4). Doctoral students' research aims to contribute to a new body of knowledge and claim self-authorship (Batchelor & Di Napoli, 2006). Doctoral students strive to achieve newness and uniqueness in

knowledge contribution and practice (Lee, 2009). This form of research builds upon past discoveries to find new realities and opportunities. Learning to fulfil the contribution to new knowledge encompassed ‘*steep learning*’ (Pst1), where ‘*each subject was a new learning area*’ (Pst4). The scope of research at the doctoral level was ‘*very different*’ and required a ‘*different way of writing*’ (Pst4).

*‘...it’s been a **steep learning curve because not being in HEI**, you know in higher education, in an institution presented quite a bit of challenge...’ [Pst1]*

*‘...I think one of the issues that for me, makes this a bit more difficult is, this is **my first foray ever into education**, so all my background is banking, insurance, economics, business administration, so this is a **very different, new area, a different way of writing...**’ [Pst4]*

Doctoral research was viewed as ‘*a big process*’ that is ‘*very intense*’. It demands time and energy (Pre2). Although the students entered the doctoral programme with years of work and life experiences, doctoral research's depth and rigour is an experience they never encountered before and takes longer than initially thought (Pst5). Past research activities were viewed as the smaller ‘*r*’, while a doctoral research was considered the bigger ‘*R*’. A doctoral study was deemed as ‘*something quite grandiose*’ and ‘*belittled all those*’ past research (Pre7).

*‘...that’s just the fact that this is **a big process** that’s **taking a long**, you know, **taking a lot of time and energy** and **it’s very intense** and I do feel a real need to see the end of it (laugh).’ [Pre2]*

*‘I’m also learning that things **take longer than I thought** they would so when I first thought, when I first started this doctoral whole thing, the [doctoral programme’s acronym] I thought oh, I’ll just get through the modules and the thesis will be easy you know, it’s only 50 thousand words, but **it’s just seems to all take longer than you think.**’ [Pst5]*

*‘...I have the title of researcher in my head as something quite **grandiose** and, and have kind of **belittled** all those things that I did in my, in my previous life, in, secondary, and 6th form on, and that’s not research, that’s just you know, a research with a little “r” whereas what I’m doing now is research with a capital “R”’ [Pre7]*

Students’ work and life experiences and past learning also shape their implicit, explicit and tacit knowledge. Past learning is a ‘*continual process*’ that helped build the foundation upon which to conduct research, and the doctoral journey is in ‘*continuity*’ with that learning (Pre2). Often, students found themselves referring to previous learning materials as refreshers to look for information and

reference lists that would support deeper reflection, add knowledge, and support existing research (Pre5, Pst1, Pst2).

*'...I really appreciated the way the **coursework helped us build the foundation** for our **thesis**, right? And so, I have actually done a lot of work on, on my proposal, and I'm actually using, I've done a lot of work on that already in I think 8 or 5 or 7, so you know it is one **continual process** which is **helpful** I think that's how the **experience** has been for me. I think the fact that we had to **continually reflect** on our, our coursework and do the **doctoral development plan**, that's all **fed into my thesis stage** and that, that's been very helpful for me...' [Pre2]*

*'...I think I've **learnt quite a bit**; I've done **research** before both in my earlier formal courses and so some of the information that I'm exposed to right now, there're just a **refresher**. However, I've **gone deeper into knowing** a lot about case study, **how knowledge is acquire**, how you **gain knowledge**...' [Pst1]*

Learning was viewed as a new challenge because it was unstructured and fluid. It encompassed new discoveries, finding one's 'own paths', and mapping one's 'own journeys' (Pre3, Pst3). The journey to discovery involved making wrong decisions, turning back, and repeating the process, a kind of learning that defied all initial expectations (Pre3, Pst3).

*'...the doctoral course; you **finding your own way**, and I said you're **creating your own map**, and it is a really **difficult** journey, it is the **most challenging educational experience** I've gone through...' [Pre3]*

*'...I'm going in the direction that I think is right, and then every month or so, my tutor will go, "oops, you've **gone the wrong way**, you **need to kind of take a few steps back**", and for me it's just, I know I'm gonna get to the end point.' [Pre3]*

When learners face difficulties forming inter-related concepts into one body of research (conceptually difficult knowledge), and when the experience of learning is met with the adoption of different perspectives (foreign or alien knowledge), learning becomes new, alien, and challenging (Hill, 2010; Perkins, 2006). The constructivist learning approach presented at the doctoral level can exercise a high cognitive burden on the students, and not all students react well to the challenge (Perkins, 1999). As adult learners, students enter the doctoral programme with a pre-conceived idea of research and learning. When their learning experience was different from what they perceived, their emotional capital caused inner struggles. According to Meyer and Land (2006), doctoral

students' learning presents troublesome knowledge. Students must learn to cross the learning threshold to gain new insights into their research and themselves.

Also, doctoral learning is never straightforward, but one that takes students one step forward and 'a few steps back' (Pre3). The 'going back and forth' (Pst3) process, even though frustrating, affected change and refined students' research concepts, theoretical framework, methodology, and research questions (Pre4, Pst4). McKenna (2017, p. 462) described the above experience as 'getting stuck and unstuck'. 'Every single step' was 'constructing', and in the end, the 'bits and pieces' came together (Pst2).

*'...sometimes I think the process of **going back and forth** takes a long time. I mean, not that my primary supervisor doesn't do it right away, he is very considerate and often responds fairly soon. In general, the **process of going back and forth** just takes time. So that, it **takes months** for you to go through the different stages...' [Pst3]*

*'...I think everything we do, **every single step** is showing me that like it's **constructing**. **Bits and pieces** are **getting together**.' [Pst2]*

When learners build their conceptual idea of research by putting the pieces together, the process changes and refines their research, allowing them to cross the conceptual threshold. Here, learners experience breakthrough moments and transition from undergoing troublesome knowledge to a more refined understanding of their study (Gina et al., n.d.; Meyer & Land, 2006). While research is a 'difficult mysterious thing that people do', one student's strategy to success was being 'methodical', 'working bit by bit through each step', regularly recording decisions and maintaining a research log (Pst5). Paying attention to the details of the research process helped Pre2 unfold her research piece by piece. Pre7 attested that the 'depth of knowledge' offered by a doctoral programme is something beyond her imagination. Possessing in-depth knowledge developed students' intellect and confidence, allowing them to speak with authority and engage in intellectual conversations (Pre6, Pre7). Students admitted that doctoral study increases knowledge (Pre4, Pre7, Pst1, Pst2, Pst3, Pst5), and creates new learning and understanding about research concepts and topics (Pre6).

*'...it's been a wonderful journey of, of gaining **more knowledge**. There are so many things I did not know and would not have known unless I had put myself into this position of, of studying a doctoral programme.'* [Pre7]

*'I've **learnt a lot about my topic**, for example, from my literature review, from my discussions with others, from writing my research proposal, and from my ethical clearance, I've learnt a lot about ethics clearance and its consideration for others.'* [Pst3]

With renewed understanding, students felt '*capable of engaging with others*', which resulted in renewed respect from colleagues and friends (Pre7, Pst4). The increase in knowledge also developed students' skills and thinking ability. Students' academic writing skills, use of language, and scope of vocabulary improved. They also developed information search skills, critical reading skills, critical discussion skills, and skills in using research tools (e.g., for referencing and data analysis) (Pre2, Pre4, Pre6, and Pst3). Here, students demonstrated the application of cognitive and psychomotor learning domains, where knowledge developed students' intellectual skills to grasp concepts and act upon those concepts, as claimed by Randall (2011).

*'...I would say in terms of main changes has been in the, even in my **vocabulary** I feel there is a big change, in the kind of words you pick up because you're reading and then you start associating yourself with sort of **concepts** and, which you would not use in the normal course of things. Even writing, I mean, it's, it's, it helped in my **writing** also a lot, not that, I mean as an accountant we always write but that's different from this kind of writing, so, and one of the biggest learnings for me has been the **citations and the referencing**.'* [Pre6]

When learners repeat and enhance their research skills, they reinforce learning and transition from novice to proficient or to experts over time, as stated in Dreyfus and Dreyfus' (2005) *Conceptual Framework of Skills Acquisition*. Although the students did not claim to be proficient or experts, this type of skills development is similar to what Dreyfus and Dreyfus' (2005) emphasise, that people develop their skills and competencies as they spend time practising or repeating those skills. Those people become more experienced and competent (expert) at completing tasks and no longer rely on procedures and rules (Dreyfus, 2004). When people no longer rely on procedures and rules, their skills bring them into a state of increased automaticity that forms habits (Lally et al., 2010). The above implies that, when students' skills acquisition reaches a habitual state, they are said to reach the expert level. Each time students discover something important that refines their research, they leap

into another new state, where their knowledge and skills acquisition goes through a new cycle of development. The improvement and refinement process continues to evolve until students' research goals are met. Please see the quote below.

*'I say that because I've had to **change my subject for so many times**. I've had **to change my research question a number of times** and every time that I've changed my research question I've had to **change the theoretical framework and methodology**, and therefore, surprisingly I've been able to find the methodology that works with the particular research question.'* [Pre4]

The doctoral research also functioned as a training ground or as an *'apprenticeship'* programme that transitions and forms students' identity into a *'researcher'* (Pst5). Students' thinking transitions (the notion of becoming) and assumes the role of the researcher as they progress in their learning and research. Students move or orientate from 'one state of being to another' through the transition, which implies progression and transformation over time (Barnacle, 2005, p. 179). At the beginning of the students' doctoral journey, students had not developed a researcher's identity. Pre7 felt the *'title of a researcher'* was *'grandiose'* and admitted that she could not *'sit comfortably with the title of a researcher'* (Pre7). She felt her position as a teacher sat well. Pre7's notion of identity resonated among the doctoral students. They began to acquire *'the initial sense'* that their mind is *'functioning'* and *'streaming'* in parallel with their research progress (Pre2, Pre4). As their research began to be supported by facts and evidence, their thought-process validated their ability and their thoughts reflected substance. At this point, students developed a deeper understanding of research concepts and their perception surrounding their research. The experience presented a shift in students' epistemology and allowed them to claim the researcher identity. According to Wellington et al. (2005), the identity and behaviour patterns adopted by a person generally include habits, ideas, responses and expectations. Often, doctoral students who are working adults experience internal conflicts and tensions when they try to balance people's expectations of them as professionals and the university's expectations of them as doctoral students. Nevertheless, when students become more comfortable with the researcher identity, they find ways to balance both sides' expectations.

*'But when you have a theory, and you find that it is proven elsewhere, it is no longer just a theory, it is that **your mind is functioning** and **it's streaming properly**, and **it is proven**, and I think for me that says, **that speaks volume for your, one's ability** to process ideas and thoughts, and where one may have previously look for validation from others, **one can now find that validation in researching one's thoughts, understanding** one's concepts, and **perceptions**, and move from there in, by using research to further understand and to come to a **conclusion** on the **validity** of one's I would say **epistemology**.'*
[Pre4]

Epistemological understanding begins to develop when students assume the researcher's role and reflect research thinking and process geared towards the original contribution to knowledge (Wisker et al., 2010). The epistemological understanding only happens when students cross the conceptual threshold at different points of their research journey. When students cross the conceptual threshold, they experience transformative, bounded, irreversible, and integrative learning. McKenna (2017) claims that a successful doctoral journey is an identity journey that entails a shift in understanding one's research, contribution, and intentions. When the idea of a conceptual threshold is understood and its depth is obtained, the status of the researcher reaches the doctoral level (McKenna, 2017). At this point, students gain self-worth and recognition and engage with other practitioners as equals.

*'...for me the doctoral level symbolises a plateau if you will, of learning and thinking that I would not have said that I would, I don't know where **worthy or capable of engaging with others** on that level until I went through the programme. Having gone through, to **this stage** I now feel that **I am able** to, to kind of **hold my own** if you will, with anybody else who's gone through the **doctoral level**...' [Pre7]*

The most challenging aspect of a doctoral study is accomplishing the original contribution to knowledge. The discussions in this section conclude that research is not a linear, straightforward process. The students experienced moments of ups and downs where their research progress presented forward-and-backwards encounters. Throughout their research engagements, students gained new knowledge, skills, and identity. They also experienced the emotional roller-coaster rides where triumph, struggles, uncertainties, and shifts in ontology, epistemology and methodology brought about a change in the 'self'. The next section discusses different transformation stages that entail the adaptation and renewal of 'self'. The transformation involves the process of becoming, which allows students to discover their voice and achieve self-authorship in their research.

4.3.3. Transformative learning

Students experience emotional ups and downs in a research climate that exhibits ‘aha moments’, triumph, anxiety, and uncertainty (Morrison-Saunders et al., 2010). As the students progress into different phases of their thesis stage, they experience different levels of interactions with their ontology and epistemology. When students enter the thesis stage, they demonstrate enthusiasm, motivation, high expectation and passion. This first step into the research world is what Batchelor and Di Napoli (2006, p. 18) call the ‘*island of expectations and passion*’. In the beginning, students develop a strong bond with their research topic (close to heart). Ontologically, students’ passion is the highest at this point, where excitement and motivation overshadow the struggles that are to come. Epistemologically, students’ bearing in research is still at an immature state because they are trying to secure their footing in their research idea, scope, context and aims within a wide spectrum of the knowledge domain – a scenario presented at the proposal writing phase. This early stage of excitement and enthusiasm refine students’ cognition and motivate them to engage in further discovery.

*‘...in my **initial proposal**, I had put forth a research question, and subsequent re-drafts had led me into an area as, just as you’re saying, in researching, on a topic that I thought was very relevant to the research question and to myself. I was **dissuaded from that path** and on my, I guess a **100th attempt** to do it, I came right up against that very same, I encountered that thought again, and I began to pursue it, and realised having gone that road, it **led me into an area** that I didn’t know existed, but it was what I’ve wanted. And so, the **discovery has always been such a wonderful thing for me...**’ [Pre4]*

As the students progress further in their research, they began to realise the complexities surrounding doctoral-level research. They began to realise that the idea of their initial research needed to be narrowed down. They learnt that research at the doctoral level is a ‘*big project*’ (Pre2), a ‘*grandiose*’ pursuit, and has the big ‘*R*’ written all over it (Pre7).

*‘...mostly looking for **information regarding processes**, at this point, right? Like **what is the next step** that I need to take to get through this **big project...**’ [Pre2]*

They faced challenges identifying and understanding research concepts, e.g., research design (Pre2), educational research (Pst5), epistemology (Pst3), theory, methodologies, and theoretical frameworks

(Pst3, Pre6). They also struggled in the practical aspects of research where specific skills needed to be applied to carry out research. The '*sheer scale of information*' and '*knowledge*' at the doctoral level made Pst4 '*less confident at mastering the breadth*' of her research, a feeling not felt for a long time.

*'I think for me, although I've been able to argue well, grasp information [inaudible segment] I've found some interesting insights in all my working life that I'm finding now that, just a **sheer scale of information knowledge** in this area, makes me perhaps, for the first time in a long time, probably even **less confident at mastering the breadth**, and maybe that's just at this stage I'm at.'* [Pst4]

Some of the practical struggles were learning how to use Mendeley for referencing, NVivo for qualitative data analysis (Pre6, Pst3) and SPSS for quantitative data analysis (Pst2, Pst3). While others were able to learn and utilise different tools to support their research work, for Pst2, analysing quantitative data using SPSS was troublesome knowledge. Despite support from several experts, she was still not able to cross the learning threshold and use SPSS for data analysis. Spending time learning statistics was frustrating and Pst2 felt the time spent could have been better used to improve her research work.

*'You know the most **frustrating** moment was the time that I had to **spend on the statistics...** I asked **everybody**, you know (short laugh), I **knocked so many doors**. I asked my friend who is a mathematics teacher ... he's **trying to explain those terms** for example, **but I don't understand it**, you know, and then when I understood it with so many people's help, my [a nationality] friend's help, in the end. I said like it was so easy, you know what I mean? It, I didn't understand why I couldn't understand at that time, maybe frustration, maybe stress, and formulas you know, Excel, on Excel, or SPSS, they will do it like this (snap fingers) but **I don't know how to use SPSS, I still don't know.**'* [Pst2]

Pre2 claimed support on applying practical skills to research was one of the things missing in the thesis stage; a skill that should be provided at the early stage of the thesis stage.

*'I think there's also been a bit of a piece missing (laugh) and I'll tell you this because you helped me a lot with this but sometimes **I found missing in the information is some very practical tools** like you're the one who shared with us Mendeley for example, right? Like at the residency, which has been incredibly helpful resource but I didn't see that, but that was coming because you took the initiative right? So, sometimes I don't see a clear trajectory to help, you know, helping us, **connect us to some of the very practical resources...** I would have loved **to be introduced to some of those resources really early on in the process...**'* [Pre2]

At different times, experienced challenges and obstacles triggered negative emotions. Pre3 found 'finding your own way' or 'creating your own content' was 'really difficult'. To her, everything was new. The need to contribute to new knowledge meant facing uncertainties where content could be unclear. Pre3 described it as 'don't really have an anchor' and 'walking and wearing glasses that are kind of fuzzy'.

*'For thesis, it's almost, you're not creating your **own content**, but you're presenting it **in your way**, you're **researching** in some, in **narrow**, and it's, everything is **unique**, everything is **new**, so you **don't really know**, I mean you know what type of thesis, viva questions you're going to get but the content is not clear, the content you're kind of, you're creating **new content**. So, that it's been really **difficult**...' [Pre3]*

As far as the doctoral research is concerned, students also claimed they 'never studied in this format' (Pre7) before, there is a lot that they do not know, and it involved a 'steep learning curve' (Pst1). When faced with challenges or troublesome knowledge, crossing the learning threshold was never easy. Pst4 felt she does not 'have the capability' to carry out doctoral research, suggesting self-doubt, while Pre1 felt she is 'not there yet' and that she had not 'really learnt yet' or 'felt it' yet, while struggling to cross the learning threshold. Students also expressed feeling 'stuck' (Pre5), 'awful' (Pst2), and 'inadequate' (Pst2, Pst4) at different points of their research.

*'...I can interpret the data but those numbers like **really kill me**, and a statistician would probably answer the question, my question, in like, I don't know, one hour or two, and I spent like a month or two. Seriously, and I **felt awful**, I felt very **stressed**, I felt **inadequate** and the rest of it.' [Pst2]*

In general, students' struggles and challenges (negative experiences) discussed above were expressed with words such as 'tedious' (Pre1, Pst3), 'difficult', 'fuzzy' (Pre3), 'still stuck' (Pre5), 'tough journey', 'lonely' (Pre6, Pst7), 'frightens me' (Pre7), 'really kill me', 'feel awful', 'stressed', 'frustrating' (Pst2), 'discouraging', 'big hurdle' (Pst3), 'inadequate' (Pst4), 'hard', and 'not easy' (Pst5).

*'It is **discouraging**, you do feel like, "oh no" you don't know if you can actually finish the process. Yeah, but then [inaudible segment] you know, you feel like, "oh, I've already put 4 years into this programme" (laugh). Am I going to throw it away now?' [Pst3]*

This growing sense of insecurity resulted from students' engagement with the complex research process. Batchelor and Di Napoli (2006) state that the experience of negative emotions constitutes the most difficult moments for doctoral students. Their findings suggest that, when students' ontological motivation loses its momentum, their epistemological doubts increase and trigger negative emotions. The above reveals that students' doctoral journey combines cognitive and emotional responses, which are crucial aspects that sometimes surprise them.

Due to the challenges and negative emotions, students felt the time was slipping away and they could not present the extensiveness of doctoral research (Pre6, Pst3, Pst4). While the struggles were real, they were part of the doctoral learning journey, and this awareness helped students apply various coping strategies, such as applying a methodical learning structure, keeping a log (Pst5), engaging in positive self-talk and encouraging self-motivation (Pre7, Pst1).

*'...so it's sort of as **each step arises**, and so I haven't got through the proposal, data collection, you know, then I started to read about probably I should have done this before but you know, analysing the data and stuff, so I've kind of just for my own, **so I don't panic, just taking it as the need arises** and then look at the stuff.'* [Pst5]

*'...**saying to myself**, "yes, you're on the right track, you've gone through these 9 modules, you're on the right track, you're now at the, at the end stage, don't start wobbling now, you're on the right track", I think and that's what the information helps to provide for me to allow me to keep going.'* [Pre7]

The students' learning strategies and progressive hard work illuminated the '*light at the end of the tunnel*' (Pst7). The students' progress and discoveries built confidence, established focus and refined the students' research topics further. They improved their assessing, discerning (Pre2) and thinking skills (Pre4). They increased knowledge, improved their ability and competencies, and began to accept the researcher identity (Pre4, Pst3). While experiencing 'lightbulb moments' at different intervals, the students continued to explore, and they developed a sense of enjoyment and fascination at how their research had evolved (Pre2, Pst6). Positive moments occurred when students were able to fit theories, ontology, epistemology, and methodology concepts into their research.

*'I think in some ways I've **become more confident about learning, assessing** what, what I need to learn at this point. Again, I compare it to where I was, at when I started the whole programme and you know, I was very much kind of the empty slate taking whatever came at me and just kind of jumping in to that, now I think I'm **more discerning** you know, I have a clearer sense of what I need to learn or need to know at this point...' [Pre2]*

*'...I definitely know what it is I would like to research. It has also taught me to be **confident about my theories**. It has also taught me that **I am good at finding the relevant information...**' [Pre4]*

When students reached clarity in their research, they expressed a greater sense of enjoyment and fascination. Some researchers call such moments crossing the conceptual threshold (Gina et al., n.d.; Land, 2013; McKenna, 2017; Meyer & Land, 2006; Wisker et al., 2010), and they are said to be irreversible (Land, 2013), hence, resulting in change or transformation in the person. Students enjoyed reading new content or topics (Pre2). They found the new-found experience '*fascinating*' and '*wonderful*' (Pre2, Pre4, Pre6, Pre7). The journey to discovery was an '*added pleasure*' (Pst2), an '*amazing exposure*' and a '*fantastic opportunity*' (Pst4). It was '*incredibly rich*', '*incredibly insightful*' (Pst4), and '*joyful*' (Pst6). For Pre2, experiencing that personal connection with information was exciting because it spoke her '*language*'.

*'...I **enjoy the content, I enjoy the topic** and I'm finding that **fascinating...**' [Pre2]*

*'I encountered that thought again, and I began to pursue it, and realised having gone that road, it **led me into an area that I didn't know existed**, but it was what I've wanted. And so, the discovery has always been such a **wonderful thing** for me...' [Pre4]*

*'To me, the **discovery of new knowledge is so joyful!**' [Pst6]*

While ontological and epistemological shifts are reflected in the student's transformation, findings also reveal that students experience a methodological shift. As students develop new knowledge and skills, they apply new principles and procedures of inquiries to reflect the doctoral level. They evolve in the use of search methods (Pre5, Pst3), academic writing (use of words and language) (Pre6), and the use of new programs and tools (e.g., Mendeley, NVivo, Zotero, SPSS) (Pre3, Pst3). At the beginning of the research journey, these skills were not present but were acquired and developed as the students progressed.

*'...I would say in terms of main changes has been in the, even in my **vocabulary** I feel there is a big change, in the kind of words you pick up because you're reading and then you start associating yourself with sort of **concepts** and, which you would not use in the normal course of things. Even writing, I mean, it's, it's, it helped in my **writing** also a lot, not that, I mean as an accountant we always write but that's different from this kind of writing, so, and one of the biggest learnings for me has been the **citations and the referencing.**' [Pre6]*

When learners develop their skills, they transition from novice to expert (Dreyfus, 2004). The expertise displayed by a learner depends on their learning condition. At the expert level, when rules and procedures no longer apply, intuition and discernment are added to the application of skills and decision-making (Dreyfus & Dreyfus, 2005). If applied long enough, the new skills become the norm (achieving automaticity and becoming habit), at which point procedures and rules are embedded and are no longer consciously applied (Lally et al., 2010).

As the students progress further, they transform '*problematic frames of reference*' (expectation and assumption) into a more inclusive, reflective, open and emotional state of change. In reflecting reflexively on their position as researchers, the students interrogated their philosophical stance and fundamental assumptions concerning reality and the nature of knowledge. The processes of reflecting and reflexing promote transformative learning (the framing of thinking, feeling and acting) that causes a significant and lasting change in the learners (Mezirow, 2018). The ontological shift resulted in students seeing the '*bigger picture*' (Pst6), gaining '*different perspectives*', understanding there are no '*right or wrong*' answers, and that there is no '*one correct way of viewing things*' (Pre3). The frequency of questions increased (Pre3, Pre5), and the thought-process reflected criticality (Pre4, Pre7). For some, criticality not only involved thinking but mirrored reading and writing (Pre4, Pre5).

*'As a person, only that I think a lot more about things, and I pause and think before I respond. You may not think so (laugh), I pause before I respond. If somebody asked me a question about education, I think I used to just have an instant, "this is what I think", boom. But now, again talking about these **different perspectives, there isn't right or wrong**, there isn't one correct way of viewing things, or, so I do **think about things a lot more, and analyse**, I think I kinda **delve into things a lot more** [...] If somebody asked me a question about education ... I think I used to just have an instant, "this is what I think", boom. But now, again talking about these **different perspectives, there isn't right or wrong, there isn't one correct way of viewing things**. So, I do **think about things a lot more, and analyse**, I think I kinda delve into things a lot more ... I **question things so much more, and I don't have one straight answer**. I agree or disagree with something, there is so much behind. Oh, how do I describe this? There is so much behind...' [Pre3]*

*'Well mostly to help make me a **critical thinker**. It was brought to our attention in the module early on, the involvement, the role of **critical reading, critical writing, critical thinking**, all the different criticals, and that's, I think what this thing wishes, the doctoral level, from the masters level is that **you're not so gullible** like you, **you asked why**, you **inquire** and you **don't make rash judgements**...' [Pre5]*

Table 4.5: Doctoral students' transformative learning

Transformative category	Expression of Transformative Learning	Quoted by
Seeing the bigger picture	Focus on higher education changed A shift in career and learning direction	Pst2
Critical, analytical, logical thinking	Think about things a lot more Delve into things a lot more Critical thought-process It makes sense Become a critical and rational thinker The level of thinking has shifted Changed and sharpened thinking	Pre3, Pre4, Pre5, Pre6, Pre7
Change in perspective	Used to have instant answers Gained different perspective There is no right or wrong There is no straight answer There is so much more behind the scene There is no one correct way of viewing things	Pre3, Pre4, Pst4, Pst5

	Brings new insights Understand peoples' view better Broaden viewpoints	
Reflection and reflexivity	Question things a lot more Ask why and inquire Think a lot more Pause and think before responding Slow down Self-questioning Self-talk Deeper understanding Do not make rash judgements	Pre2, Pre3, Pre5, Pre6, Pre7, Pst1, Pst3
Attitude	Not so gullible A greater sense of confidence Validation to self More thoughtful Discerning Pragmatic	Pre2, Pre4, Pre5

Table 4.5 summarises students' descriptions of transformative learning. The development in thinking contributes to the development of 'self' that reflects confidence, maturity, patience, acceptance, respect, and discernment. Decision-making was made through the application of explicit (facts), implicit (skills and competency), and tacit (intuition and experience) knowledge. Mezirow (1991, p. 88) posits that the development of adult learners' cognitive structure and mental process through doctoral learning leads to 'decentration, symbolization, self-awareness, perceptual consciousness, role and perspective-taking, bracketing, and hypothesizing'. His idea of perspective transformation claims that, as adults learn, their cognitive development is more perceptive. It encompasses

reflective and critical thinking, appreciating multiple perspectives, and questioning assumptions, as claimed by Stevens-Long et al. (2012) and as reflected by the students in this study.

When students no longer struggle with conflicts and reach maturity in learning, their confidence allows them to enjoy and appreciate their doctoral journey (Pre4, Pre7, Pst2, Pst6). Assuming the role of a researcher, they begin to envision their future that entails achieving *'something professionally'* (Pre1) that could create *'new paths'* and *'specialisation'* (Pre6). They envision *'post-doctoral study'*, *'attending conferences'* (Pre7), travelling *'the world'*, bursting *'through that restriction'* (Pst1), and changing careers (Pst2). Pst2 saw the doctoral journey as a great achievement and felt it was her way of redeeming herself due to past educational failures. For others, being called a *'Dr.'* (Pst1), accomplishing something at the age of 50 or 60 (Pre5, Pre7), adds meaning to life. For Pst7, pursuing a doctorate was regarded as a life-altering experience that fulfils self-actualisation.

*'...what I'm currently doing will assist me in my **career shift** or **career change**, perhaps in the next 3 to 5 year or so. And so I want to complete it, I want to be called Dr. [interviewee's name]...' [Pst1]*

*'I just wanna get over with. It means nothing to my career basically, I'm at the peak of where I'm gonna be, and at my age I'm not looking for any higher position at this point unless they're offered to me, and I'll likely be retiring in 4 or 5 years, and I just wanna make sure **that when I'm done I can say I've earned a doctorate in my 60s.**' [Pre5]*

*'I'm **doing this for me.** I'm doing this for me, to **self-actualise.**' [Pst7]*

They also want to see others in their position. Moving forward meant inspiring others to pursue a doctoral study (Pre7, Pst1), to remain relevant and to play more active roles in work, community, and family (Pst4).

*'...I have a friend here on campus, he's more of my hubby's friend, he's my husband's friend, so he's become my friend and he is 55 and **he is now thinking of doing a doctorate**, and I now feel it's my **desire, my duty to encourage him to do it**, say "yes, yes [friend's name], go do it, and whatever I can do to help you, then just do it, and I'll give you whatever support I can give you". I think that has been, I think one of the **pivotal learning lessons** for me is that now **you've done it, go help somebody else do it.**' [Pre7]*

*'... for me, I want to **remain relevant** and so undertaking my learning is important to me, **maintain my role, an interesting role in my society, in my work, community, family.** So that's, that for me remains a very big **motivation.**' [Pst4]*

The highlight of students' doctoral learning is when their ontological, epistemological, and methodological shifts experience a positive transition. When the transition happens, students develop a deep awareness of their research and identity, and all the challenges and despair transform into hope. As students acquire a clearer sense of direction and self-worth, they reach the most mature stage in their doctoral study. Their delicate ontology becomes stronger at this mature stage as a result of increased confidence in their epistemology. Students' ontology and epistemology work in harmony at this final stage and allow students to envision their new roles, with the doctoral status. It is here that students transition from a state of 'becoming' into a state of 'has become', achieving self-authorship and a newfound respect for the 'self'. With the new identity, the students felt 'worthy' and that they are 'capable of engaging with others' or 'anybody else' at the 'doctoral level' (Pre7). The students felt they have 'walked the journey' (Pre7) and have 'become a researcher' (Pst2).

*'...I think also it is a proof of **my first step towards research.** I think when I complete this qualification, I think it proves that **I can develop into a researcher.**' [Pre6]*

*'...for me the doctoral level symbolises a plateau if you will, of learning and thinking that I would not have said that I would, I don't know where **worthy or capable of engaging with others** on that level until I went through the programme. Having gone through, to **this stage** I now feel that **I am able** to, to kind of **hold my own** if you will, with anybody else who's gone through the **doctoral level...**' [Pre7]*

4.4. The nature of doctoral-level information support services

Throughout their doctoral learning, students' information and research needs are supported by online and human sources and resources. The availability and effectiveness of the information sources and resources (information support services) shape students' information behaviour and learning.

Students expect their institutions to offer comparable or better services than what they are already experiencing. HEIs can no longer afford to react to online students' needs; instead, they need to proactively formulate strategies to ensure online students experience the best possible services offered (Newberry & DeLuca, 2014). This section discusses students' experiences with information support services through support personnel and the information systems. It also discusses how students envision ideal information support services (ideas for improvement).

4.4.1. The role and contribution of support personnel

Students' information and learning needs were supported by supervisors, a student support manager, and library and technical support personnel. Pst1 was generally satisfied with the 'level of support' provided by information support services.

*'...I think that the **support mechanisms**, their **information services** and so on is **quite reliable** by the university [...] I'm **generally satisfied** with the **level of support**, with types of information you can access, and you know, the information is there for your retrieval...' [Pst1]*

The support rendered by the student support manager and library staff was generally satisfactory (Pst1, Pst3). Pst1 claimed the students' support service was responsive and was always available to help students.

*'Of course when you **face a road block**, there is always **somebody to help you**. Whether you going to send it to the **student support service**, they're normally **very responsive**...' [Pst1]*

*'There are times that I have reached out to **library support** especially in the early stages and they have **helped me** to find the article, but I never learned the process myself.' [Pst3]*

In the interviews, students also shared several positive and challenging experiences while interacting with support personnel. The experiences shared by students were encountered by individuals based on specific needs and at specific times. Some students faced difficulty identifying support sources. They were unsure who to contact when faced with challenges (Pre3). Some of the challenges that were highlighted included long response (Writing Centre and technical support) turnaround time

(Pre4) and not getting any response (library) for the submitted request (Pre5). Students also suggested that the student support manager assume a more proactive role (Pre7). However, the suggestion seems challenging as the students support manager assigned to students changed frequently, and there was no opportunity to establish a relationship and receive support at a personal level (considering human feelings) (Pre7).

*'...I've had technical issues in getting into the library or in getting records or something, I find it a little **frustrating** because **you can't actually get a person**. You have to **submit a request**. I've submitted some request that have gone into a black hole somewhere. I've **never heard back** and, never...' [Pre5]*

The most active form of communication and support comes from the supervisors, followed by faculty members. Sánchez-Elvira Paniagua and Simpson (2018) claim that distance learners' success in learning depends on emotional, cognitive and organisational support. The extent of the student-supervisor relationship determines the depth and richness of learning. Students were generally satisfied with the student-supervisor relationship, which reflected mutual trust, respect and proactive interactions. The relationship reflected proactive relationships that promoted constructive discussions, debates, and positive progress on students' research work. Students who have a good relationship with their supervisor engage in regular meetings to keep their progress on track. For Pre3, regular meetings with the supervisor functioned as a regular '*checkpoint*' and put her '*on track*' and helped her stay '*more focused*'.

*'...I was gonna say just the **guidance** from the tutor that comes **every month**, that kind of **puts me on track** in a way I wish, for the way that I learnt, **I wish that it was more**, that I would meet her every 2 weeks rather than every 4 weeks. It would certainly keep me **on track** and keep me **more focused** on what I'm doing, because I do have my kind of lazy...' [Pre3]*

With doctoral-level research, students relied heavily on supervisors' guidance and expertise. The supervisors act as information providers, subject-matter experts, advisors, counsellors and mentors. Pre4 admitted feeling lost for information if communication with the supervisor was irregular. Students sought counsel from their supervisors for '*finding the path*' (Pst3) in research, for suggested sources (website links) and resources (reference list) (Pst3, Pst7). For Pst1, the sources and resources

provided by her supervisor eased the burden of navigation and search challenges and provided easy access to information.

*'And I also **counsel** with my **supervisors** and after I had written a lot, and I thought "okay, there isn't very much in this particular area that I had seen, specifically", but then **my secondary supervisor helped me, gave me a number of references** to look these up, you know, which was very **helpful** for the topic. So, I would say between **my own search** and the **counsel of my primary and secondary supervisors was very helpful.**' [Pst3]*

*'At one point I didn't know where to find that community but there's now **a link right in the discussion forum which was very helpful**. So instead of me tracing all around the place to find it's right there in my discussion portal. The Blackboard. **My tutor posted a link there** and there's also a link with the handbook so it was, you know, it's very easy to access than searching through so many portals, and so many bits of information as well.'* [Pst1]

The expertise and competencies of supervisors also played a major part in adding value to students' research work, as such traits add criticality and rigour to the quality of research (Pre7). Pre4 and Pre5 also claimed the discussion sessions provided reliable support and valuable feedback (expert judgement), which added value to their research work. The feedback provided by supervisors who functioned as experts '*validated*' and '*confirmed*' students' writing and research content. Good relationships provided room for open discussions, healthy debates, and frankness in opinions, thus enriching the learning process.

*'...to be honest, when I get an email from my supervisor I actually print it right away so I don't lose it so I can see it, read it. And so, as much, you know I would like to see more of that just to, not because I look for information but because **I just need confirmation. I need affirmation** that I'm **on the right track**, that I'm not going down some wrong path, and then I'm kind of keeping up with my peers.'* [Pre5]

Generally, students described their supervisors as competent, critical, approachable (Pre7), helpful (Pst3), encouraging (Pre2), supportive (Pst1, Pst7) and insightful (Pst4). For some students, the supervisors were always available and were responsive to students' questions and requests (Pst1, Pst5), and the students considered those responses efficient (Pst6). Pst3 admitted that her '*determination and self-confidence*' were '*up and down*' but the continuous encouragement provided by her supervisor helped her progress.

*'...[tutor's initial] bequeathed or suggested, put herself forward as being my **primary supervisor** and I grabbed that suggestion with both hands because she had been such a **competent** and just a **critical but competent** and **approachable tutor**. I thought that's the kind of person; whether she understands my topic or not, I would have chosen her because of that, because I figured, you know, she does understand my topic area which is great but what I know I would have needed, would have been that **critical, competent, approachable tutor** which I have with her...' [Pre7]*

*'...you have [tutors' names] you can **reach out to them any time**, they're normally **available**, and they **respond very quickly** to whatever concerns that you have.' [Pst1]*

The support rendered by supervisors also helped students to explore extra sources and resources (Pst3, Pst7), stay focused (Pre3), be on track (Pre2, Pre3), set targets (Pre3), structure the research (Pre3), apply criticality to research (Pre7, Pst3), fine-tune the thesis (Pst3), identify a suitable framework (Pre2), and be more accountable to personal work (Pre2).

*'So, in terms of skills I kind of feel, I still feel that I'm fumbling but I kind of pulled into structure when I talk to my tutor. So, it has helped me. I think I just **asked so many more questions**. I look at things from so many more different perspectives now...' [Pre3]*

*'Well I think the key part of the experience has been the **encouragement of my supervisors** and it's actually been **both the primary and secondary** have been involved already, and so that experience I think impacts my learning, I think it helps me. They **certainly help me stay focus** and **provided a framework** you know, in terms of the **timeline** that I needed to follow, that kind of thing, or, you know, they certainly let me propose that timeline but **they hold me accountable...**' [Pre2]*

In general, the student-supervisor relationship reflected positivity and proactive interactions. According to Tait (2000), support services' main functions encompass cognitive, affective, and systematic support. Such support not only involves technical infrastructure but also establishes identity (one-to-one interaction with support personnel), individualisation (based on learners' specific needs and goals) and interpersonal interaction (equal and mutual interaction for learning and performance) (Thorpe, 2002). The discussion above revealed that students received learning and emotional support from their supervisors.

While supervisory support was generally positive, students also faced challenges that reflected personal opinion, perspectives and expectations of individuals. The main challenge was the communication and expectations of the first and second supervisors. The flow of supervisory

(reviewing students' thesis) responsibility (first supervisor then second supervisor) and the varied views on how research should be presented, cause confusion among students (Pre2). The difference in supervisors' opinion and expectations meant several revisions to students' work to fit both views that at times were contradicting (Pst3). The process affected students' time, effort and progress.

*'...there are things there **aren't** helpful because they're tell you two different things, right? (laugh) Well, you know, even on this question of, you know, I've had two different messages about whether or not I needed to go through the ethics approval processes ... so you know, I'm getting different messages...'* [Pre2]

*'...I don't know **between the primary and the secondary syncing**, maybe the time should have been sooner, it should have been synced earlier, instead of waiting till the 8th, you know, But **it took a few more rounds of correction before it went to the secondary supervisor**. That was like draft 14 and then there were more suggested changes and finally at draft 16, the paper was approved.'* [Pst3]

Pre1 highlighted that the expectation and standards between supervisors varied and caused inconsistency in revision attempts. She claimed that the supervisors assigned to the students influence the quality of work. They also reflected inconsistency, where proposal structure and format are concerned.

*'My reason for saying that is because I felt I **spent about 8 months writing my proposal**, and **my tutor is quite hard** because some of the things that I've seen even when [tutor's name] sends out you know, that people should join other people for their 1st research, I mean, my tutor spent a lot of time going over, **he wanted an abstract this particular way**, and a lot of it seems to me as being **inconsistent at the [university's name]**...' [Pre1]*

*'Again for me the main situation is when you see such **huge differences in the proposal that have been approved**, that you know, somebody has written a 1000 something words and that has been approved, yet you know, you're supposed to write 4000 words, and you see the **differences in the quality** of the proposal, so, it tends to show almost a situation where it is **based on which tutor you get**...' [Pre1]*

Human presence was seen as an important element in students' information and learning support. The human interactions provided meaningful relationships that built students' internal structure (mental and emotional), a support mechanism that could not be provided by the online information systems alone. Pre2 expressed appreciation for the '*hybrid model*' where '*strong virtual or online resources*' were also supported by a '*person at the end of the line*'. The combination of '*virtual support*

and the human support' was necessary and helpful. The hybrid support model is important because the thesis stage is like the *'deep blue sea'*, where students are dispersed and dissipated (Pre3). Talking to someone such as the supervisor made students feel *'really connected'* because the absence of human presence was frustrating (Pre5). Interacting and learning from others helped students learn better and kept students motivated (Pre6). Pst5 acknowledged that information could be sought from online resources, but having *'someone to talk through'* that information was *'good'*. Pst5 suggested incorporating *'videos of people talking you through things'* as an additional support mechanism.

*'...I've come to really **appreciate** a bit of a **hybrid model** that has you know, a kind of **strong virtual or online resources** but also at the end of the day it has a **person at the end of that line**, so, (laugh) to be able to **talk** to, to my supervisor, to [faculty's name], you know, and talk, you know, by that I mean e-mail or Skype but the fact there's some, yeah, there's both ends, there's the **virtual support and the human support**, that combination I think is necessary. The fact that we've had a doctoral tutors all along the process that kind of were helping us reflect on the process has been helpful.'* [Pre2]

*'...I look forward to the library, and occasionally I get **affirmation** from **talking to** you or [tutor's name], who is **my supervisor**, and when I have my phone call, what do they call, phone call, the presentation, and I actually got to **talk** to [tutor's name], that was like "wow" I mean now I **feel** like I'm **really connected**.'* [Pre5]

When the interaction with information support personnel is scarce, the doctoral journey can be a lonely one. Ludwig-Hardman and Dunlap (2003) claim that learners who do not possess a self-directed skillset may see distance education as challenging. Self-directed learning skills can only be developed by interacting with colleagues, peers, or a community of practice (formally or informally). According to Knowles (1975), students who enter a programme without self-directed inquiry skills experience frustration, anxiety and failure. Pre5 felt isolated and ill-equipped to deal with the nature of online education. His information and learning interactions were confined to communications with supervisors and support personnel only. Pre5 emphasised the importance of identifying people (putting names to faces) in his learning environment. Putting names to faces lets him know that *'there is someone behind the electronics'* (Pre5). He needed to feel connected and affiliated to the people behind the screens, to know that there is a real-world out there and that it is not *'fake'*. Rowh (2014) emphasises that making real connections with online learners is crucial to success. E-mail alone does not provide the *'human presence'* and *'human touch'* for students to stay engaged. He claims that

students need easy access to support personnel 24/7 and suggests incorporating in-person, online chat, video sessions, phone and e-mail.

*'You know, I think **faces of the people we deal with**, I think **biographies** so that I know [inaudible segment]. I mean for example the [university's name], and we don't have that many grad students, and if we're all required to just one time check in with the library, director of library services, or whatever, to know that there is **someone behind the electronics**, that actually sets up the information systems and so on. Otherwise you have no connectivity. So a person. We can't meet in person but **we can build up a relationship** via Skype is the next best thing and kind of like sharing a cup of coffee and a cup of tea together. Other than that, my ideal would be, it's pretty ideal the way it is for me now except that **I need more personal connection and affiliation with the people behind the scenes** because in a classroom setting we would get to know the professors' little idiosyncrasies that someone always comes in an tie [inaudible segment] to one side and we all have a little private chat, those kind of things. We don't have any connectivity like that here ... when you **don't connect with these people**, sometimes **you begin to wonder like is this all fake...**' [Pre5]*

LaPadula (2003) states that the need to foster a sense of community is more substantial for distance learners. Students need to interact academically and socially to progress in their study. She claims that when students are given the platform to chat and share learning challenges, problems, frustration and uncertainties, they overcome their fear and develop self-confidence through talking and getting advice from others. They also become more competent, efficient and effective learners as their self-confidence levels increase. Such an interaction is what the doctoral students hope to experience. According to Rowh (2014), comprehensive support should go beyond academic boundaries and include social opportunities for off-campus students. The next section continues the discussion of information support services through online platforms and reveals its influence on students' information behaviour.

4.4.2. Usability and user experience of the online information system

The Internet and the World Wide Web provide vast opportunities for HEIs to offer integrated information services designed from the students' viewpoint. The services have the chance to blend functions and cross-services boundaries by personalising and customising them to individual students (Shea & Armitage, n.d.). Apart from support personnel, the university provides various online portals to support doctoral students' learning. The online portals consist of websites, a community page, chat application, and a content/learning management system. The concept of user interface design

and usability in any information systems is vital in creating a representation of users' cognitive processing for effective information acquisition (Khan, 2011). Where usability is concerned, the user interface design of information portals must be effective, efficient, error-free, easy to learn, easy to use, and satisfying to the users. A well-designed interface of information systems promotes effective learning because it reduces navigation-cognitive load, increases interactivity, and increases learners' motivation (Bashir, 2018). Students with sufficient information and digital literacy skills express overall satisfaction in information sufficiency. Two students complimented the range of materials available in the library, describing them as '*extraordinary*' (Pst4) and '*powerful*' (Pst6).

*'Well the library has **access to extraordinary range of materials...**' [Pst4]*

*'Since the [university's name] library is quite **powerful**, I can **access the journal articles easily.**' [Pst6]*

The university provides various information portals to help students access different information for different purposes. According to the International Organization for Standardization (ISO) (2018), the dimensions of usability include effectiveness (users' ability to achieve specific goals), efficiency (resources used when performing a system-supported task) and satisfaction (users' comfort level and acceptance of the overall system). The information systems provided high volumes of information, but their user interface design and usability presented diverse challenges to students. When the interfaces of information systems do not incorporate usability principles, users experience arrays of emotions such as distress, frustration, anxiety and apprehension (Zaharias, 2009). The use of online information systems presented their own sets of challenges. The main concern was that access to '*many different avenues*' was overwhelming (Pre2). The existence of multiple systems meant having to maintain '*many passwords*' which also meant having to change passwords at different times for security reasons (Pre1). Multiple systems also meant information was widely placed at different locations, requiring extensive exploration, thus making navigation daunting, challenging and time-consuming (Pre2, Pre3, Pst5).

*'There's so many ways you can connect with (laugh), right? Like we go to [inaudible segment] or you can go on the Blackboard or you know, whatever it is right? Like there's **so many different avenues** for getting information or connecting with folks that sometimes it's a bit of an **overload**, and I tend to just withdraw to a very narrow band of possibilities...you get information here and you **get information** there, it's a **big piece meal** still.'* [Pre2]

*'...there's **so many passwords** you need for everything, and the **password kept changing** ... why can't you not use the same, and so I stayed away a lot from [university's name].'* [Pre1]

As a guide, when a system fulfils usability principles and has a well-designed user interface, users do not require heavy cognitive processing in navigation and usage. In this case, if good user interface design is integrated and reflected in the information systems, then students' cognitive and emotional efforts are directed towards learning tasks rather than towards system use. When organisations maintain a centralised point of access to information and services (a one-stop site), it provides personalised assistance to students (Presley & Presley, 2009). When access to information becomes easy, it reduces the navigation and access challenges.

The information presented by different systems displayed inconsistent structure, format and arrangements. The use of several systems meant different information is located in different systems for different purposes. Searching for specific information was 'very difficult' (Pre4), and took time and effort due to the disparate locations and arrangements. It was a going '*round in circles*' and going '*back and forth*' experience (Pre3) that forced students to '*search and search and search*' (Pst1). Displaced information challenged information search efforts and some failed to locate needed information for research (Pst2). Such a scenario caused students to stop searching (Pst2) or to '*withdraw to a very narrow band of possibilities*' (Pre2), which meant the systems failed the students. At other times, students' search efforts led to the discovery of outdated information, a scenario that wasted time and effort (Pre2, Pre3). When the navigation around information systems is confusing and complicated, users will avoid exploring or using the system entirely (Barzegar et al., 2009).

*'Sometimes you **can't find the articles** for example, or sometimes there may be, I don't know, I mean sometimes I can't find the particular article I'm looking but you know **I stopped chasing** that...'* [Pst2]

*'...I tried to find the correct Ethics Forms for the thesis stage thinking that they would be located in the same way as documents we accessed during our modules. Unfortunately, they weren't there and **it took up quite a bit of my time trying to source them** only to find out that I had used on **old version** ... those **standard forms weren't there**, and I just felt like I **went round in circles** ... I asked my first tutor, they went back and forth. I got them from my first tutor, and when I submitted them, I was told they were **out of date**...' [Pre3]*

The experiences described above call into question the structure and arrangement of information in the information systems. Some of the views and expressions provided by students were, '*not easy to sift out what applies to us*' (Pre2), '*information that's not clearly delineated*' (Pre2), '*there isn't a consistency*', (Pre3), '*it isn't as structured as I would like*' (Pre3), '*I'm clicking into various places*' (Pst5), '*Blackboard is just so clunky*' (Pst5), '*information is quite scattered and placed at different locations*' (Pst6) and '*difficult to read through mobile phone/tablet*' (Pst6). Advancements in mobile phones and tablets meant students would access information through smartphones or tablets (Pst6). However, the systems' design and structure do not cater to small-screen viewing, making navigating and reading challenging. A learning screen (a big or small screen size) represents the visual design elements of images, typography, infographics, videos, menus, buttons, and characters in an online learning environment. When these elements are not displayed as intended (on small screens), it creates a chaotic and unpleasant information arrangement. Navigation becomes impossible, and students miss the opportunity to learn while on the go.

*'... **not easy to sift out what applies to us** and what doesn't apply to us, so, I am looking for **coherent in the information** and you know, that I guess, we're going back to the supervisors and to [tutor's name] is quite helpful, right? But, yeah, it becomes **difficult** when there's competing or **information that's not clearly delineate**...' [Pre2]*

*'...I like structure and I like things to kind of look the same. For me it **isn't as structured as I would like**, or I find things in different places.' [Pre3]*

When students' frustrations persist, they interfere with students' learning goals (Hara & Kling, 1999). Increased anxiety reduces students' storage and processing capacity, which may cause them to be demotivated and make bad judgments. For adult learners to be self-regulated, online support systems' designs must reduce frustration (Secreto & Pamulaklakin, 2015). For students, navigating their way around the system was difficult (Pre3, Pst5). Pre2 felt like she '*stumbled*' across information

'more by accident' than by planning. When navigation presents difficulties, students expressed concern that important information may be overlooked (Pre3) and that insufficient information may affect the depth of their research work (Pst5). The experience also led Pre3 and Pst5 to question their ability and skills: 'this might be down to my lack of skills' (Pre3) and 'I'm not hugely skilful' (Pst5). Pst5 did not 'know how to' or 'where to go' (Pst5), a scenario that described guilt, doubt and confusion.

*'And I feel a bit **guilty** cause I've never posted anything and **I don't even know how to**, I don't even know where to find it on the page, I get these e-mails and I can only see half of the post and **I don't really know where to go**, I've forgotten where to go to find the actual post...' [Pst5]*

When students failed to locate the information they needed, they claimed the information was not available or not provided by the university's systems. Those who failed to fully utilise the information support systems as intended felt that they were robbed of their time and effort (Pre3, Pst5). Students felt their time would have been better spent on learning than on exploring and navigating the information systems. Working adult learners, in general, have very little time to spare. When students spend a long time navigating and searching through the information systems, they are taken away from doing actual research work, making them unproductive. As a coping strategy, they resorted to using external systems which they felt presented a better variety of information and displayed user-friendly interface design. Although technology, educational tools and learning services have existed much earlier, education and learning services have not adapted to modern information and communicative technologies (Barzegar et al., 2009). Presley and Presley (2009) claim that students' attitudes and behaviour are affected when the information systems are not useful or easy to use. When an institution (internal systems) is slow in its technology and design adoption, external sources and resources become alternative measures, as shared by students. The students in the present study felt external systems provided more straightforward and practical user experiences than did those provided internally. To some students, external portals provided richer resources than did internal ones.

*'...I'm gonna say the number one thing that I found **difficult** was just **navigating my way around the site**, in case I had missed something that was so relevant to me that would have been so useful. So, how did I get that information? I try to navigate. I was concerned that, who do I ask? I'm not actually sure...' [Pre3]*

*'...sometimes you can be surprised by this Googling some scholarly topic and **paper show up there that you can't get in the library.**' [Pre5]*

The discussions above suggest that the usability of the information systems (design, functionality and features) directly influenced the students' cognition and emotion. It suggests the presence of the user experience concept (emotional expression caused by the usability of information systems) that is widely used in designing the user interface of information systems. The user experience demonstrates users' subjective feelings and attitudes while using a product – in this case, it is the information support systems (Wan Ahmad & Ali, 2018). Students used words such as '*guilty*' (Pst5), '*stressful*' (Pst5), '*difficult*' (Pre3, Pre4), '*frustrating*' (Pre5, Pst4), '*feel at a lost*' (Pre4), '*hard*' (Pst5), and '*confused*' (Pst6) to describe their emotions when using the information systems.

*'What I find sometimes incredibly **frustrating** is trying to **get the right information** in ... I've had to **put it in multiple ways** and ... that process I've found quite frustrating...'* [Pst4]

*'...it is a bit **hard to navigate** your way around . I mean it would be nice if we could just go and click on an e-book and it will all be there. But you kind of go in and out of things and I did find, I mean finding the thesis matching quite **stressful** because I felt like I haven't had quite enough information...'* [Pst5]

The quality of users' experience relies on the hedonic aspects of using a system (Hassenzahl, 2008). Hedonic aspects address humans' need for change. It is viewed as a novelty or social status (Hassenzahl, 2001). The visual design, sound design, interaction techniques and functionality of a system are hedonic quality drivers. Hassenzahl (2005) claims that, when a system achieves hedonic quality, the users are said to experience stimulation (change, novelty or personal growth), identification (identity communication and relatedness), and evocation (symbolising and memory retention). Achieving hedonic quality means information systems must incorporate usability principles into their design – an area that needs to be looked into.

The challenges and emotional expressions shared by students were not solely dependent on the issues surrounding the information systems. As mature professionals, the students were able to acknowledge personal weaknesses and shortcomings that contributed to challenging experiences. Pst3 acknowledged that her lack of knowledge contributed to the difficulty in using the library

system. For others, their lack of pro-active use caused difficulty in using and familiarising themselves with the information systems (Pre4, Pre6, Pre7, Pst1, Pst3, Pst4, Pst5). For Pre1, using external systems such as Google Scholar was a personal preference.

*'...I would say somehow that even though I use the library a lot, there are **certain aspects of the library I'm unable to access because I don't have the knowledge...**' [Pst3]*

*'...I think it's for me now **to reach out and use them. I haven't utilised them to maximum potential really...**' [Pre7]*

Often, users of information systems are expected to accept and accustom themselves to the services offered by the information systems. The study of information behaviour is one way to encourage organisations to understand how people use and behave around information systems. It will help the organisations identify usability and design strategies to create personalised and customised interfaces and information support that meets the users' patterns and needs. It is therefore important for information systems decision-makers to acquire knowledge on usability and user experience, to help them formulate better strategies for their information users.

4.4.3. Envisioning the ideal information support services

As students shared challenging experiences using the information support services, they also proposed several ideas for improvements. The suggestions are divided into several categories that reflect the usability principles of service and user interface design, and will also be reflected in the final recommendations of this study.

Centralisation: A centralised page with one login credential would provide ease of use (Pre1). The centralisation of the information system will minimise students' cognitive effort (remembering multiple login credentials) and will ease students' access to numerous information systems and portals.

*'...I personally always felt that if you can have **1 password to access [university's name] online, why can't you not use the same...**' [Pre1]*

Consistent and user-friendly design: The user interface design should reflect consistency and accuracy and be user-friendly (Pre1, Pre2, Pre3). An effective interface design will minimise navigation efforts, such that manoeuvring becomes simple and effective.

*'The ideal is **simple to manoeuvre**, as **user-friendly**, also a situation where students can actually **give feedback** as to its usage, so little **questionnaire** to find out how **effective** the usage has been, one that hopefully has you know, less to do in terms of use of password, I really spent a lot of time **accessing...**' [Pre1]*

Information structure and categorisation: The presentation and arrangement of information and documents should reflect each thesis phase (Pre 1, Pre2, Pre4, Pst6). When information is arranged based on the thesis phases, it allows for immediate identification and access to information.

*'... the way we **access** these resources, I'd like it to be **more streamlined** ... I'd like a **more sleek way of getting into accessing the information** that we need (cough) you know I appreciate those, list of documents and files and templates, they're there but maybe it would be helpful if it was **categorised according to the stage** or the **process** we're in, to have a space that's' really looking into thesis proposal stage, and have a space looking at ethics approval process, you know, like each of those stages that might be helpful...' [Pre2]*

Coherent and updated information: Information published on the information systems or portals should reflect coherence and match the thesis stage's latest development (Pre2).

*'...I think again in terms of ideal information support services, be **carefully managed** so that everything's **up to date**, I think some of the things I found have been outdated, so, there's a bit of that, and I understand how difficult that is to keep everything up to date and then back to the idea of **coherence**, I think it's important, that's very clear what applies to us as online students and what doesn't. So easy to get so much information that it has to be very **clear**, that it's **applicable** to the work we're doing.' [Pre2]*

Availability: There should be 24/7 access to support personnel at the end of the communication channel that could provide an immediate response to students' requests and questions (Pre3).

*'...it would be good to have maybe to have two sources, one is the [country name], and one is somewhere else. So **you have availability 24 hours**, so **there is always somebody there**, you know. But something like that would be ideal for me, and it's really just a **quick question** where I don't feel like I'm talking to a proper academic, or a tutor, or I'm not gonna get this very formal response, or I'm **not gonna have to wait for 48 hours** before, I think that would be really be useful.'* [Pre3]

Human presence: There should be information support services to provide access to experts, such as data analyst, statisticians, editors or proofreaders, referencing experts, and coaches (Pre2, Pst2).

*'...I really **needed a little bit more support** but I don't know how they would provide either because everyone's need is a little bit different. Maybe there **could be a tutorial**, you know. Well, **if there's someone from the [university's name] that can provide us, a kind of statistician**, which we can book and ask or specific questions, share our data ... we could **benefit from an editor**, a person who edits your work ... **a good APA support** ...'* [Pst2]

Skills acquisition support: Sources and resources to develop practical or hands-on research skills and tools are needed by students (Pre2, Pre4, Pst2, Pst3, Pst5). There is a need that information is made available where practical skills' tutorials, services and materials are shared with students.

*'But a lot of the resources accessing now, I'm looking at resources related to the topic I'm studying but a lot of them are also you know, **how to**, you know, **how to use NVivo** for example, or **how to write a thesis**, or, those kinds of **kind of tools**, for **writing a dissertation**, are interesting to me.'* [Pre2]

Replicate taught-module structure: It would be helpful to replicate some form of learning mechanism from taught modules into the thesis stage to promote information sharing and learning through active reading and discussion activities (Pre3).

*'...**the support group**, I found during the modules it was **great**, because we were kind of forced is the wrong word but we were kind of **made to work together** because of the task, and it was a short term task, but as soon as we came to the thesis stage, again, talk about this **deep blue sea** that the group had kind of **dissipated**, everybody **had gone**. It would have been lovely if there was some kind of way that we could have kept those groups going...'* [Pre3]

Short-term interventions: Introduce short-term interventions or set requirements for better progress and accountability (Pst4).

*'...I would love in terms of **time management** that would really help is to look at regular e-mail to say, "[student's name], **you now need to do this**, by such and **such a date**, and you need to do that", so an e-mail that would "**ping**" and I read it and say, "okay, right", and another one, "ping", that's not going to happen. One it's not going to happen **because you're at doctoral level...**' [Pre7]*

4.5. Conclusion

The exploration of the doctoral students' information behaviour provided insights into students' understanding, decision-making, and action as they continuously interact with information. It revealed information behaviour activities, learning at the doctoral level, and experiences in using information support services. The next chapter will discuss key discussions that contribute to the new body of knowledge. It will also look into the limitations and recommendations of the research.

Chapter 5 : Discussion

Past research has not studied the information behaviour of highly non-traditional adult learners pursuing a professional doctorate in an online learning environment. With higher education institutions (HEIs) facing a global shift in the way they offer education programmes to students, a paradigm shift is mandated, especially when providing educational services to non-traditional adult learners. The demographics of learners are constantly changing, according to current global shifts and trends. Over the years, the enrolment of adult learners pursuing postgraduate studies off-campus or online has increased (U.S. Department of Labor, 2007). Although most HEIs provide a full array of support services to full-time on-campus students, many have neglected to offer similar services to part-time off-campus students. This is because, for most HEIs, serving part-time off-campus students was never the campuses' mainstream agenda (Newberry & DeLuca, 2014). What is commonly seen is that the responsibility is generally placed under the purview of a department or a programme, resulting in duplicate systems (one for on-campus and one for off-campus).

Online adult students deserve comparable services enjoyed by their on-campus counterparts. According to Newberry & DeLuca (2014), HEIs have failed to live up to the expectation of online adult students. Many tend to react rather than take a proactive stance. What the present study has shown is that HEIs can no longer afford to just react to online students' needs, but must take an invested interest in non-traditional adult learners and formulate strategies to ensure their learning experiences are as robust as are those of on-campus students (Newberry & DeLuca, 2014). The general assumption held by many HEIs is that the information environment shares common information services and is no different from one mode of study to the next. This is where the present study offers a unique perspective from which HEIs can take a closer look at online learners, according to the following points.

1. The participants are highly non-traditional adult learners.
2. The education is a professional doctorate.
3. The learning environment is in a purely online (off-campus) mode.

This chapter discusses the key findings that contribute to the new body of knowledge related to Wilson's (1997) information behaviour conceptual framework. In comparison to other information

behaviour conceptual frameworks, Wilson's framework focuses on the human aspects of information behaviour rather than on the information system, and this fits well with the aim of the present research. Discussions in this chapter are supported by the major themes and sub-themes that were discussed in Chapter 4. With the emergence of new patterns discovered in this study, a modified information behaviour conceptual framework is proposed. The new framework reflects the iterative process cycle of information behaviour, the information-sharing component as a new addition, aspects of socialness in information behaviour, and transformational learning.

5.1. Key findings

Wilson's (1997) information behaviour conceptual framework guided the present study. Please refer to Figure 2.2 in Chapter 2 for an overview of the framework. The framework indicates that the information behaviour process flow is sequential and that human-related theories are present between the information-need and the information-seeking activities. By emphasising the person-in-context, Wilson (1997) claims that, when the need for information is identified, the information-seeking activity is influenced by Folkman's (1984) stress/coping theory, Settle and Alreck's (1989) risk/reward theory, and Bandura's (1977a, 1977b) social learning and self-efficacy theories, which were detailed in Chapter 2. Most importantly, the individuality and attributes of the person-in-context play a major part in shaping a person's information-seeking behaviour, thereby influencing information behaviour in general. Although the scope and components of the study were identified and defined beforehand, the present study demonstrates that the information behaviour patterns of the doctoral students in an online learning environment differ from the original framework.

5.1.1. The iterative and non-sequential information behaviour process cycle

Wilson's (1997) framework suggests the information behaviour process cycle is sequential. It indicates that the three components of information behaviour – information needs, seeking, processing and use activities – are triggered in a sequence, as influenced by the person-in-context. Wilson's (1997) framework suggests an ideal scenario of the information behaviour process cycle, whereby all information found is processed and deemed relevant, therefore triggering information use. On the contrary, findings in the present study revealed that the information behaviour process

cycle of the online doctoral students is not as straightforward as Wilson's (1997) framework suggests. In a doctoral learning environment, the findings suggest that 1) the information behaviour of the doctoral students is not sequential but presents a back-and-forth process flow (iterative cycle) of gathering the needed information to fulfil the students' research goals, and 2) the information processing and information use are two separate components due to the filtering, comparing and decision-making actions that resulted from the information seeking activity.

Hence, the key findings point towards the development of a new framework that fits the context of this study and the information behaviour of the doctoral students. Figure 5.1, below, depicts the doctoral students' process flow. Although the new framework is fundamentally guided by Wilson's (1997) framework, the flow of the activities was revised to reflect that of the doctoral students. Since information-sharing was identified as part of the doctoral students' information behaviour, it is also reflected in the new framework. The present study also posits that the human attributes concerning the person-in-context are directly linked, such that they influence every activity reflected in the information behaviour process, not just the information-seeking activity. Three additional human attributes are also added to reflect the background of the students who have been identified as highly non-traditional adult learners, and who possess properties of adult learning style, experience and skills.

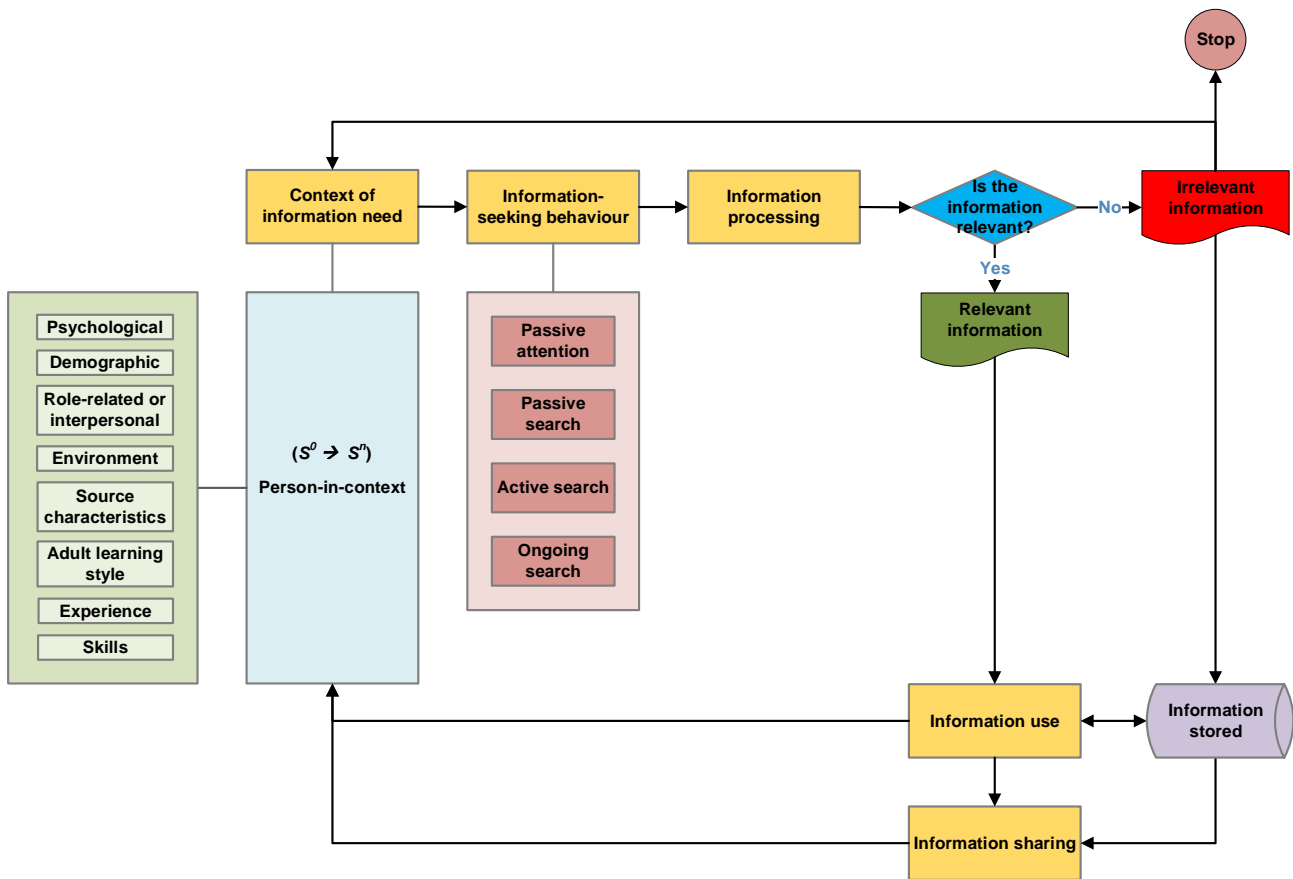


Figure 5.1: The doctoral student's information behaviour framework – the components and its process flow

In Figure 5.1, the start of the information behaviour process cycle is determined by the doctoral students (person-in-context), who are the information users. Their attributes and individuality shape their behaviour, actions and reactions in the information environment, hence shaping their information behaviour. The nature of doctoral research is that each student's research topic is unique and is not commonly shared by others. Therefore, their information needs rely on their individuality and on their research needs. As soon as students identify the information they need, they proceed to seek the information. The information-seeking activity produces a high volume of information that needs to be filtered by comparing the information to the original goals set during the information need activity (information processing). At this juncture, students have to decide if the information found is relevant or irrelevant to their needs. The relevant information is stored and used. At times, the relevant information is also shared with others when the need occurs. Alternatively, if the information is irrelevant, students exercise one of the three actions: 1) trigger a backward flow (create a loop) from information-seeking back to information-need (to identify a new information

need and to search for more information), 2) store the information for future use or share the information with others (when needed), or 3) stop information-seeking activity and use alternative information. Finally, information-use completes the information behaviour process cycle. As long as the students are in the programme and are working on their research, they will continue to repeat the information behaviour process cycle to fulfil every goal set for their research. When the students use the information and complete the process cycle, they experience learning that reflects doctoral education. When students repeat the process cycle and learn, they experience a shift in their knowledge, skill, and mental and emotional structures (called the 'self'). These changes are permanent and irreversible, which is a direct result of transformative learning (Mezirow, 1991; Mountford, 2005; Stevens-Long et al., 2012).

5.1.2. Information-sharing and the socialness of information behaviour

The doctorate programme, from the very beginning, has socialness present in its information and learning environments. Students cite sharing information and interacting with others for information, guidance, tutoring, and advice. The main factor that promotes information-sharing is the underlying principle of collegiality among students that demonstrates purposeful interaction in building relationships and stimulating the intellect. This resembles Brown's (2019) study on doctoral learning, in which information-sharing is embedded in the student-supervisor interactions and the strength of their relationship determines the extensiveness of information-sharing. Although students' information-sharing activities are generally performed online, the annual residency programme and self-initiated face-to-face meetings are alternative platforms for information-sharing. Wilson's (1981) earlier information behaviour conceptual framework indicates 'information exchange' as a permanent construct of information behaviour, but was later removed (Wilson, 1997). Wilson (1981) claims that any form of information exchange cannot be observed, as it takes place at the cognitive level. He also rationalises that the information-sharing construct is not included in his later (Wilson, 1997) conceptual framework because information users may or may not decide to share information. In the present study, information-sharing is part of the students' information behaviour because the nature of doctoral learning requires interactions that stimulate intellectual inquisitiveness and discoveries. It is also an engaging activity because the nature of the online learning environment triggers the needs to create a social learning environment. Failure to interact with others poses the danger of isolation and loneliness, as cited by the students in Chapter 4. As highly non-traditional

adult learners, the students have a learning environment that is not confined to the university's online environment but includes learning at the workplace and even at home. The students' learning environment (inside and outside the university) consists of professionals who are faculty members, fellow students, colleagues, subject-matter experts or researchers and family members. As revealed in the findings, students are bound to interact with such people, one way or another, for their research. Through shared representations, common roles and environment, people are bound to interact and collaborate (Karunakaran et al., 2013), especially with other students as they share similar learning experiences within a common learning environment. The most important aspect of the students' information-sharing activity is when they learn the tacit knowledge (skills and experience) of others – the kind of knowledge that is not found in textbooks but is ingrained in the individuals. Such sharing of information polishes the students' knowledge, skills, and mental and emotional capacities, which results in quality learning outcomes and research. Such outcomes would have never been achieved, had it not been for the interactions with others – a scenario that creates socialness in information behaviour. In the present study, information-sharing is not just about exchanging information with others. It is about what happens as a result of that sharing: the relationship building, the networking and collaborations, the intellectually stimulating conversations that challenge the core of the students' research, and the embracing of new worldviews. It is the kind of information-sharing that changes perspectives and transforms people.

5.2. Contribution to new knowledge

The key findings discussed above indicate that: 1) the students' information behaviour process cycle is not sequential but iterative, 2) the information-sharing construct is embedded in the students' information behaviour, and 3) when students use information, they experience a transformative 'self' (they experience ontological, epistemological and methodological shifts). These shifts allow for the development of a new information behaviour conceptual framework that represents the context of the study (doctoral education among adult learners in an online learning environment). Figure 5.2 illustrates the influence of doctoral education and the online learning environment on the doctoral students' information behaviour.

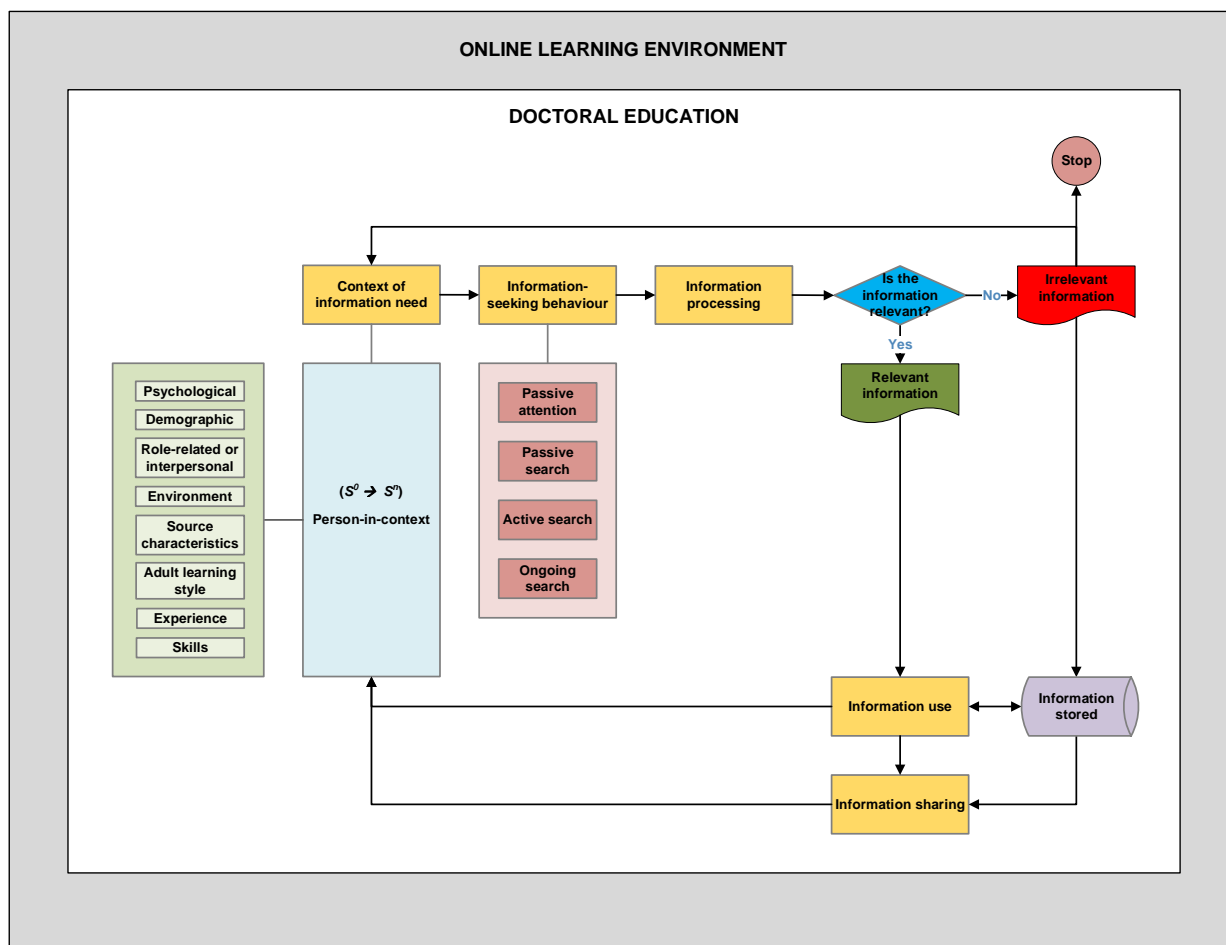


Figure 5.2: The influence of doctoral education and the online learning environment on the doctoral students' information behaviour

The present study claims the attributes (psychological, demographic, role-related, environmental, learning style, experience and skills) of the students shape their identity and individuality and, therefore, have a direct relationship with the students (person-in-context). As a result, the behaviour of the person-in-context affects every component of information behaviour (information need, seeking, processing, use and sharing) because who they are influences how they behave within their information environment. As students complete the information behaviour process cycle and use information, they experience transformative learning wherein ontological, epistemological and methodological shifts occur. When students experience the transformative shift, their structure of 'self' (S) changes: from their old structure (S^0) to their new structure ($S^0 \rightarrow S^1$ or $S^1 \rightarrow S^2$ or $S^2 \rightarrow S^n$). Godbold's (2006) study on information behaviour claims that, when a person completes the information behaviour wheel, the person's knowledge structure (K) changes to a new, modified structure (K'). Findings in the present study add that the transformative learning changes the

students' knowledge (*KNL*), skills (*SKL*), mental (*MTL*) and emotional (*EMT*) structure, whereby the transformative structure of 'self' (*S*) is represented by: $S = KNL + SKL + MTL + EMT$. As long as there are learning and research goals to fulfil, students will repeat the information behaviour process cycle. The repetition of the process cycle results in the gradual transformation of 'self' (from one level to the next), represented by $S^0 \rightarrow S^1 \rightarrow S^2 \rightarrow S^n$, where 'n' represents the number of times the process cycle has to be repeated until the student's learning and research goals are fulfilled and the student achieves self-authorship. This new structure is permanent, formative, integrative, irreversible, bounded and cumulative (McKenna, 2017). Figure 5.3, below, provides a visual representation of the changes in 'self', as described above.

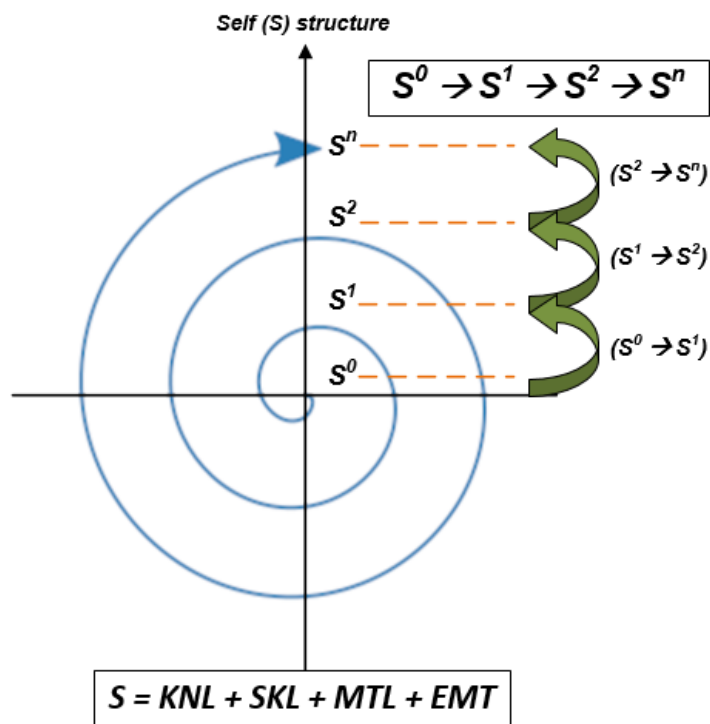


Figure 5.3: The transformative cycle of 'self' (*S*)

The new framework in Figure 5.2 and the transformative cycle in Figure 5.3 represent the information behaviour and transformation of the doctoral students in a single case study. The framework does not claim to generalise the information behaviour process cycle and its transformative outcome; rather, it argues that the relationship between information, information users, the information and learning environment, and the outcome is complex. It also claims that changes in the 'self' at the

doctoral level are not predictable but depend heavily on the person-in-context, and upon the actions and reactions of that person.

5.3. Critical reflections on the findings

This section provides in-depth reflections on what was revealed by the students. They provide a deeper understanding of the doctoral students' information behaviour, their behaviour as learners and the support environment needed to create a conducive learning environment at the doctoral level. The reflections also provide opportunities to expand the scope of the present research into other related areas surrounding information behaviour, doctoral learning and information support services. A point to note, the succeeding discussions are critical reflections based on the findings, while considering the doctoral students as mature learners with past experiences in education, vocation and personal life. As such, they are non-conventional or non-traditional learners, therefore, their maturity and experiences present deeper implicit, explicit and tacit knowledge which hold relevance to the person-in-context.

5.3.1. The influence of personal attributes on the doctoral students' information behaviour and learning

Findings suggest that the personal attributes of the person-in-context (the doctoral students) have a direct influence on the students' information behaviour and learning. These attributes shape their behaviour, thinking, perspectives, actions and reactions towards events and things surrounding them. Each of them has varied personalities and traits that are embedded in the 'self'. Section 4.1 provided an overview of the students' background and diversity which makes each student unique. In conclusion to the findings, a new information behaviour conceptual framework was proposed to reflect the online doctoral students and the present study. It was revealed that personal elements such as psychological state, demographic, role-related or interpersonal elements, environment, source characteristics, learning style, experience, and skills are factors that shape the students' identity as doctoral learners.

A note-worthy finding that occurs repeatedly is the role of self-confidence in the students. The factor was highlighted and is present in every aspect of the students' information behaviour and learning at the doctoral level. The conclusion was that the students' perception of themselves and their confidence level had a strong influence on their thinking, perspectives, actions and reactions. During different stages of their doctoral journey, the students experienced a varied level of confidence (the ups and downs) owing to the situation and demands of a doctoral study.

The self-efficacy theory was introduced in Wilson's (1997) information behaviour conceptual framework (used to guide this study). It is part of the social learning theory introduced by Bandura (1977). Although self-efficacy was not included in the proposed information behaviour framework for the doctoral students, the influence of the students' psychological state was directly linked to the person-in-context. One would argue that Wilson's (1997) use of self-efficacy theory would hold ground in the study of the students' information behaviour. However, owing to the context of the present study, the overall thinking and behaviour of the students surrounding information behaviour and doctoral learning is beyond the influence of self-efficacy. Wilson's (1997) use of the self-efficacy theory in his information behaviour conceptual framework only highlights its influence on information-seeking behaviour. However, in the context of this study, self-efficacy is part of the influencing factor that is present throughout the student's information behaviour; which is in knowing what information is needed, how much is needed, how to search for the information, how to filter the information for relevance, how to determine whether the information is useful for their research, and how to use the information to carry out doctoral-level research and learning, as revealed in the findings.

Also, the students' psychological state is equipped with other personal attributes that shape their thinking and behaviour. Therefore, a wider concept would be needed to reflect the present study. Hence, the word 'psychological' was deemed more suitable as it encompasses the study of mind and behaviour that include human development, cognitive processes, and social behaviour, which were elements present in the findings. As mature learners, the students possess a specific psychological state of awareness and they possess high-level acknowledgement of what is required to succeed in their studies, and why they needed to do what they needed to do to achieve successful outcomes.

They also understood that when these acknowledgements are met with planned actions, success is achievable. At least, this was what they thought and knew. However, the students' doctoral learning journey presented various positive and negative circumstances that changed their psychological state. There was a conflict of acknowledging what was needed and what needed to be done, based on what they were capable of doing when presented with specific circumstances. The students often experienced conflict, self-questioning, and doubts. Despite varied circumstances, the students' personalities (who they are as a person) also contributed to their circumstances, which then influenced their thinking and decision-making.

Students who were determined and who put in extra efforts were able to create a more positive reaction, while students who lacked determination and initiative relied on others and experienced negative emotions. Such a scenario pushes one to ask the question, 'why?'. Despite being faced with varied circumstances and students reacting differently, ultimately, they all came to a stage where they were able to cross the threshold and reached positive outcomes in their research and learning. The question is, was the outcome satisfactory; could it be described as the best possible outcome reached, or was the outcome achieved because of the efforts they put in? Could such a scenario provide a glimpse of self-efficacy in action, which is outcome expectancy? After all, Bandura (1977) argues that self-efficacy is the strength of a person's conviction and that it affects their persistent action. The outcome depended on the amount of effort the students put into a situation. Therefore, could it be said that their personality, traits, and the role played by others shaped their path to a successful outcome?

The doctoral students understood that their determination, motivation level, and actions can lead to a successful outcome. However, the students' perception of their capability versus what they are actually capable of doing at times contradicted one another. Could this be due to over-confidence that the reality was seen the way they wanted to be seen? Or, did the students' lack of judgement led them to think they had what was needed to pursue a doctoral research? Or perhaps, they lacked the awareness level due to not having the whole picture of the doctoral journey? At one stage, when the students' self-efficacy was put to the test and when their research entered the operation phase, they were surprised at how much was needed compared to how much they were capable of doing.

That was when students experienced troublesome knowledge and in the journey towards crossing the learning threshold, they faced conflict, frustrations and self-doubt. Although the findings revealed these, to answer the 'why' behind those emotions is beyond the scope of the research. It, however, presents an opportunity for further exploration. Nevertheless, findings of the present study support Heinstrom's (2002) result in which the students' personality is an important factor that influences their information behaviour, which is in line with Wilson's (1997) claim that the person-in-context exhibits individuality or personal traits in their information behaviour, hence, the psychological influence of that person.

5.3.2. The reliance on authoritative figures for information versus the goal of independent learning at doctoral level

In the present study, three important elements that surrounded the context of the study were online education, doctoral education and adult learners. According to Ludwig-Hardman and Dunlap (2003), one of the factors that determine the success of distance education, which in this case, the online education, is self-directed learning skillset, a learning skill that is also often associated with adult learning (Knowles, 1975). Doctoral education expects students to be independent learners, they are expected to independently conceptualise and operationalise scholarly-worthy research that reflects originality and self-authorship. At the same time, findings in the present study revealed that the doctoral students often rely heavily on authoritative figures (e.g., supervisors, faculty members, coaches, etc.), cohort members, and research or industry professionals to shape their research into a piece of work that contributes to a new body of knowledge. Considering the above, it seems the ideal scenario expected of doctoral education and adult learning contradicts the reality of the learning journey when research is being operationalised. The contradiction may be seen as a straightforward revelation but in reality, the context of the learning environment and factors surrounding it present multifaceted realities.

Upon reflecting on the findings, several questions arose. Was there independent learning amongst the students? Yes, there was. Did the students apply self-directed learning? Yes, they did. While practising independent and self-directed learning, did the students also need support from others, especially authoritative figures? Yes, they did. So, how could such a dependence be associated with

self-directed and independent learning, which is a requirement of doctoral education? In such a scenario, there are no easy answers to the contradiction but the main element that plays a role and combines all of the above lies in the characteristics of the adult learners.

Section 4.1 provided extensive information on the background of the students in the present study. Their profile did not match the profile of conventional or traditional students. The students in the present study are mature adults; mature in age, and mature in work and life experiences. They are working professionals with work, family and personal commitment. Each of them has a specific purpose for pursuing a doctoral education, a purpose deemed necessary for career development, self-achievement and self-fulfilment. Although their purpose for pursuing the doctoral study is to fulfil specific career or life goals, they also faced the reality of life where their focus was directed towards their work, family and personal life. When living in such an environment, time is of the essence and they resorted to the most feasible methods to gather information and complete their research work. The reality of life and the ideal situation to pursue knowledge and self-authorship were always in conflict. Ultimately, students had to make choices and resort to alternatives until they complete the doctoral degree.

Although the students have the capability to carry out research, the nature of doctoral education requires more than just understanding and applying facts and concepts. It requires the application of implicit, explicit and tacit knowledge to achieve originality in research work. In addition, such knowledge is not sufficient coming from one person, it requires the intellect of others with knowledge and experiences that are beyond what is known by the students. Doctoral learning requires critical and analytical thinking. To achieve criticality and to analyse information require varied perspectives. It is no longer about comparing facts. It involves analysing and comparing the perspectives and experiences of others to reach a conclusion worthy of originality. As such, information and knowledge gathered from other people (implicit, explicit and tacit) are valuable. The involvement of others pushed the students to think and be critical, especially when the information shared was dissected by great minds. The involvement of others (acting as mentors) with similar or better experiences also functioned as encouragement and moral support to the students to continue and never give up. Such human support brings a wealth of knowledge, experience, and insights that

help clear confusion (Noonan et al., 2007). Balancing work, life and study can be challenging. The students require support that promotes human-connectedness, not only for the knowledge but for the human relationship (reciprocal relationship) that builds and strengthens the students' well-being; mentally, morally, spiritually and physically.

Students may seek the support of others to shape their research but ultimately, the students are the creator of their work. Only the student alone must decide the final outcome of their research to achieve originality and self-authorship. No one else can make that decision for them. This is a reflection of independent and self-directed learning. In the end, their work must reflect originality and contribute to a new body of knowledge while they go on to assume a new role and identify themselves as researchers.

5.3.3. The influence of the socialness of information behaviour socialness in doctoral education

The doctoral programme in the present study is a professional doctorate and is divided into two stages; the taught module and the thesis stage. Students in the thesis stage have completed nine taught modules with a cohort-based learning style. The cohort-based learning style incorporated social learning practices where students actively engaged in discussion questions, learning teams, group research, and group assignments. The students were introduced to human presence, human connectedness and collegial relationship in the initial stage of their learning environment. As the students entered the thesis stage, the social learning aspect became non-existent. The nature of doctoral research meant the research conducted by the students is unique and often a 'standalone' work where elements of group discussions and group work are formally removed. However, where learning is concerned, no man is an island. Knowledge is universal and needs to be shared and discussed for the expansion and development of the intellect. Different people have different levels of knowledge owing to their individuality, cognitive ability, environment, exposure, and experiences. Although the students' research was a 'standalone' work, the fundamental principle of socialness in learning was imbued during the taught module.

Findings revealed the doctoral students rely heavily on human sources; authoritative figures (discussed earlier) and cohort members. Human support was seen as a source for information and knowledge (for learning), as well as a source of personal support (psychological and emotional), where information-sharing is part of the doctoral students' information behaviour and learning. While a majority of the students benefitted from the socialness of information behaviour and learning, there were students who felt isolated and lonely. How could the feeling of loneliness and isolation be present when human support is just a click away or a phone call away?

In the taught modules, learning in groups was compulsory and was part of the programme. Students engaged in group learning because that was the only method offered. At the thesis stage, the students were free to apply their own learning styles to complete their research. Some continued to engage with others, while others decided to become solo learners. Findings suggested that learners' personality and individuality shape their behaviour towards information and learning. Some students assume the role of information giver, while others as information recipients. The roles played by different students when combined created a back-and-forth exchange of information and knowledge that functioned as a support mechanism. Such support was voluntary, especially when a common interest is shared and others benefit from such act of kindness (Bao & Bouthillier, 2007); a sense of collegiality and commonality. Collegiality provided intellectual stimuli, professional partnership, social unity and emotional stability. Such an environment created a mutual understanding amongst the students and the spirit of togetherness functioned as an assurance that they were not alone but that they shared some common grounds and were going through similar journeys together. It was real for the students as they could relate to each other's experiences (the ups and downs).

For such socialness, connectedness and togetherness to exist, students must first want to engage themselves with others. Their decision to take that first step and be part of a team must be a conscious effort. It is through the conscious effort and willingness to function as a team member that the spirit and eagerness towards social learning are established. Without that willingness, no interaction will happen, no sharing will take place, and no reaping of benefits will materialise. For example, several students discovered new tools and acquired new practical skills (e.g., the use of Mendeley and NVivo) because they wanted to learn and there was a cohort member who was willing

to share that knowledge and skill. The development of the students is highly dependent on the willingness and reciprocity of the two parties to engage in learning activities. Without it, no amount of support or services offered would lead to an engaging outcome.

5.4. Recommendations

Ideally, the setup and design of adult learners' education and information environment should provide accurate, quick, accessible, and easily retrievable information and support services. When the education and information support environment is easy to use, is aesthetically pleasing, and provides an enriched experience, the environment increases the learners' satisfaction, motivation, learning efficacy, quality of interaction, and retention rate (Shen & Chu, 2014). The changing trends in education have made students the driving force behind education delivery and support services. For-profit HEIs need to embrace students as customers and deliver customised, personalised, and flexible education while maintaining or reducing operational costs. Adult learners are more sensitive to the information support choices made available by the institution. They are more likely to compare and contrast academic programme offerings and services provided throughout their programme. As working professionals, they demand and expect quality standards that are similar to those of the support services to which they have grown accustomed outside the institution. The delivery of such administrative and support services should be an integral part of the institution's ability to remain competitive in the higher education marketplace.

This section discusses the recommendations as a result of the students' information behaviour and learning experiences. The recommendations do not attempt to force change in the existing practices of the institution under study; instead, the hope is to provide practice-oriented suggestions by which to identify ideas for improvement. The recommendations could also serve as ideas for other institutions that offer doctoral degrees to adult learners in an online learning environment. The recommendations also do not consider (feasibility factors) the institution's existing business partnership arrangement, strategies, and operations, for the information was not accessible. The recommendations consider existing gaps shared by students, the nature of highly non-traditional adult learners, doctoral learning, and the online learning environment. The recommendations discussed herein take into consideration the fact that the students are working professionals with

extensive life and work experience and have limited time to explore information beyond their information needs. The recommendations provided below focus on areas related to 'socialness' and to the usability of information support services.

5.4.1. 'Socialness' in the information and learning environment

The findings and emerging themes show aspects of 'socialness' in students' information behaviour and learning. They also suggest that the social environment is one of the most critical factors determining research and learning progress. Institutions often rely on departments, programmes and staff to deliver the support to the students. However, the nature of the doctoral adult learners suggests that this group of students can also contribute alongside departments and faculty members to create winning strategies. Below are recommendations carefully selected to promote 'socialness' in the learning environment.

5.4.1.1. Doctoral candidates' digital presence and footprint

In the findings chapter, it was highlighted that there is a need for personal connection and affiliation with 'people behind the scenes'. It is important to put names to faces and to set up student biographies to ensure people are real and present. It was also suggested that incorporating videos could showcase students' personalities through visual presentations as such an environment could eliminate isolation. As working adults, most of the doctoral students possess a LinkedIn account that creates a digital presence in the community of working professionals. Such profiles help professionals around the world to network, share experiences, support and empower each other. They also provide career leads, professional development and business opportunities (Davis et al., 2020; Utz & Breuer, 2019). In most universities, doctoral candidates own a profile on the university department's website. The profile puts a name to a face whereby it provides information on contact details, supervisor, department, research background and doctoral candidates' background. The first step to social interaction is getting to know a person, followed by establishing a friendship and then a deeper relationship. A doctoral profile is essential to building a community of learners in the learning environment. The profile will allow students to identify other students in the programme and identify common grounds for research, learning and networking. It will help eliminate isolation and identify students with similar research areas, research interests, and supervisors. The profile page's user

interface could replicate social media interfaces that allow for background information, interactive postings, and chat messenger, functioning as a centralised communication platform to individual students. Students could interact and post research findings, progress, ideas and strategies as real-time information sources that could feed into other students' research work. The suggested platform and its functions and features would require the involvement of the department offering the programme and the information technology (IT) department at the university. The department would need to propose the needed platform and the IT department would need to plan, analyse, develop, test and implement the required platform. If resources are insufficient to create such a platform, major social media platforms such as LinkedIn, Facebook, Twitter, and Instagram could be utilised to set up programme-specific pages for registered students. These pages could be used for student-student, student-supervisor and student-faculty member interactions. Communication applications such as WhatsApp, Telegram, and Signal could be used to support the social media platforms for quick communications. This form of sharing will create a centralised digital environment that is interconnected. Nevertheless, a caveat is stressed where information security must remain a top priority.

5.4.1.2. Face-to-face or online (synchronous) regional meetings, networking and residencies

In the findings, students highlighted their appreciation for the taught modules' learning structure, residency programme and self-initiated face-to-face meetings. The structure and activities suggest 'human interaction' and 'active discussions' as common factors. Weidman and Stein (2003) argue that social interaction creates a sense of collegiality among students that could stimulate students' research and scholarly productivity. Apart from relying on the department or faculty members to organise networking and learning events for students, the introduction of student ambassadors would benefit the programme. Since the doctoral students are separated geographically and activities are limited by the time-zone factor, regional (e.g., Middle East, South East Asia) student ambassadors could be introduced. They could work closely with the department and faculty members to organise meet-and-greet events, community learning-related events, or research training and development. They could work alongside the department and faculty members to create event agendas aligned with the university and department's policies and partnership. Most of the students work in education settings and would have formed networks in their respective countries and regions. Their experience and networking could benefit the doctoral students. The events would

promote human presence and connectedness, as experienced by on-campus students with the benefit of enjoying social interactions. While staff are seen as authority figures, student ambassadors would function as peers and equals. This common factor provides for a more comfortable interaction in research and learning, as it helps build trust and foster relationships. The position also provides exceptional students with opportunities to grow their leadership and communication skills and inspire other students to play more active roles in representing the programme (Ylonen, 2012). It could serve as an incentive and add value to the students' experience, such as through work-based learning, affiliation to a reputable and well-recognised institution, and personal development (Baker & Sela, 2018).

5.4.1.3. 'Shut Up and Write' virtual spaces

In an on-campus setting, learning spaces are set up for students to promote an interactive and flexible learning environment. Similar to the learning spaces concept, the 'Shut Up and Write' movement is a way for writers to meet at a common place, structure their writing time (1 hour) and connect with others. Many universities have embraced this idea by helping students set dedicated writing time and achieve progress in their thesis chapters, journal articles, or grant applications (The Thesis Whisperer, 2013). The University of Leeds claims that, when they changed their 'Shut Up and Write' sessions from face-to-face to online, it improved accessibility and increased participants' interaction (Dalton, 2020). Participants in the present study highlighted difficulties in building writing habits, momentum and maintaining progress. If online 'Shut Up and Write' sessions are introduced, students will share a virtual room with others and set aside dedicated writing time. These virtual writing spaces will help students to develop their writing momentum and progress. The sessions could be scheduled by region to allow for a live online presence. They could utilise online meeting platforms such as Microsoft Team (the existing platform operated by the university), Zoom, Webex, and Google Meet. The department could generate automatic meeting slots in the online meeting platforms and publish the link to students. The online learning platforms indirectly function as learning spaces that on-campus students often enjoy. However, such an initiative would need the involvement or presence of a faculty member to manage the activity and to act as a facilitator throughout the session. It would also require the involvement of the support of the IT department to provide such a platform that offers the required functions and features for the writing group.

5.4.1.4. Writing accountability group (WAG)

In support of the 'Shut Up and Write' sessions, students from similar cohorts (familiarity and trust factors) could be grouped to ensure writing accountability among group members. Universities worldwide have set up writing accountability groups (WAGs) to provide the structure faculty members and students need to progress in their writing, whether for theses, journal publications or research grants (Skarupski & Foucher, 2018). This form of writing will help students to reach automaticity (a level at which writing becomes an automatic process), establish a regimen (consistent time management), form cognitive management (address problems at an appropriate time), and recognise social management (learn the unwritten rules of writing). For example, a WAG structure for a university in the United States consists of meeting sessions of 1 hour a week, for between 8 to 10 weeks. In that 1 hour timeframe, participants spend 15 minutes reporting and setting their writing goals, 30 minutes writing, and 15 minutes reporting and setting their writing goals again (Skarupski & Foucher, 2018). The Academic Writing Club (2015) of the Academic Ladder developed a subscription-based online platform in which members may participate and record their writing activities. The platform provides daily progress, access to writing coaches, statistical reports, group coaching sessions, and live chats. The writing activity reported by participants is monitored, and, if interventions are needed, coaches will be assigned, functioning as a support mechanism. Similarly, such a group could be set up for the doctoral students to bring them together, report writing activities, and encourage group members' accountability. A WAG could be used as a formal part of the students' progress mechanism that builds writing momentum. For example, the project management professionals (PMPs) need to report 60 Professional Development Units (PDUs) to the Project Management Institute to maintain their professional certification title. The PDUs certify that the PMPs are active members and have participated in project management activities to retain and develop their knowledge and skills (Project Management Institute, n.d.). A similar mechanism could be implemented together with the WAG, where students are required to collect and report specific points, like the 'Writing Units' (WU) that go into a reporting system. The WUs could be fed into students' quarterly progress reports. The initiative would require the involvement of a faculty member that would function as an administrator, the department offering the programme and the IT department as the information will need to be added to the existing reporting system. Pst4 highlighted that she needed regular interventions that are made compulsory (a requirement) in order to progress in her thesis. For example, for Pre3, if a task is not part of the programme's requirement,

she will not consider doing it. The WAG could be used to serve as short-term interventions that require weekly reports. Weekly progress was part of the taught modules' structure and is something that could be introduced in the thesis stage. The findings revealed students' appreciation for the taught modules' structure.

5.4.2. Incorporating 'usability' and 'user experience' concepts into information support services

The online learning environment means information systems support students' interactions with information and people through ICT infrastructure. Information systems, in this case, involve e-mail, websites, chat applications, and learning portals as the primary modes of communication. Where online systems are concerned, usability and user experience concepts are two critical elements that influence human-computer interactions (Alomari et al., 2020; Reeves et al., 2002; Zaharias, 2004; Zaharias & Mehlenbacher, 2012). Usability is an important quality indicator for interactive systems because it determines whether a product is effective, efficient, easy to use, easy to learn, causes minimal errors and is satisfying to users (Carlos & Rodrigues, 2012; Hasan & Abuelrub, 2011; Paredes & Hernandez, 2017; Retnani et al., 2017). Products that achieve usability goals are said to provide good user experiences. In the present study, 'information support services' is a product. It aims to motivate and assist students in learning efficiently and effectively. When the service is efficient, students spend more time engaging in learning activities than in using precious time and cognitive load to navigate and use the services (Peters, 2014). The recommendations below incorporate usability ideas because they influence user experience and encourage user satisfaction. The initiative would require the expertise of an interface design professional who understands principles related to human-computer interactions, user interface design, usability and user experience. Such a profession would need to work with the department to understand the needs and aims of the programme, its learning environment and the learning styles of doctoral students. It would also require inputs from learning experts that could design relevant learning support for the students.

5.4.2.1. 24/7 students or technical support

The findings revealed that some students faced technical issues with the information support systems (Pre4, Pre5). The standard process is to communicate the technical problems via the e-mail or the technical support online form, and the issues will be looked into within a specific turnaround

time. Technical problems are usually related to online information systems. When students face technical challenges, it means their access to the online systems is cut off. They would have to wait for a response from the technical support personnel to rectify the issues. Although technical personnel need to work around a specific timeframe, the process of waiting for a solution frustrates students. Often, instructions are provided for the students to solve the problems independently. Unfortunately, the effectiveness in solving the problem depends on the students' ability to carry out technical troubleshooting tasks. A more feasible solution is to have 24/7 technical support personnel on standby who could access students' computers remotely and immediately resolve technical issues. A remote access software allows technical experts to remotely access other computers when physical access to computers is impossible. For example, the TeamViewer software allows IT professionals to provide remote support to customers to solve technical issues while the customers are sitting in front of their monitor screens, watching their computers being controlled by someone else remotely (TeamViewer, n.d.). This solution eases the burden of customers who do not possess the technical skills with which to solve computer problems. The student or technical support team could adopt a similar approach for providing an instant technical solution that takes the burden away from students, especially from those who are technically challenged.

5.4.2.2. Counselling and non-academic support

The doctoral journey is long, arduous and stretches for a long time (years). The findings revealed that a doctoral study's demands affected the doctoral students' emotions and mental well-being (Pre7, Pst2, Pst3). Supervisors (Fac1, Fac4) claimed that adult learners have real-life challenges concerning health, mental well-being (isolation and loneliness), emotional stability, work and life issues, and motivation to learn. While supervisors provide academic support, they also assume the role of counsellors for personal problems. The challenges highlighted above are real challenges that affect a person's well-being. These issues should be supported by professionals who are trained. Besides being assigned to student managers and supervisors, students could be made aware of non-academic support, if available. If none is available, services could be set up where students could have regular asynchronous sessions to talk about non-academic challenges that affect their learning and life. Frequent checkpoints could be set up to ensure students are healthy: mentally, emotionally, and physically. Studies have shown that doctoral students experience depression, anxiety, and burnout (Liu et al., 2020; Nagy et al., 2019). Waight and Giordano (2018) claim that doctoral students are not

accessing non-academic support but resort to external support mechanisms such as family, online resources and personal doctors. They recommended clear signposting, workshops, parity of support, online self-help, and supervisor training as strategies to develop doctoral students' mental-health support. Similar initiatives could be introduced to create awareness among students and send a message that their health matters and that support is just around the corner. The hope is that access to professional counsellors could reduce non-academic challenges associated with the doctoral study.

5.4.2.3. Information presentation and the user interface design of information systems

An exemplary user interface is crucial to user experience. If the online systems' user interface is challenging to use, it will discourage users from using it. It can also overwhelm technical support with operational cost, due to the amount of support needed by users. Students who are end-users of several information systems should not have to maintain multiple access credentials (usernames and passwords) due to the programmes' business partnerships. As far as students in the present study are concerned, the doctoral programme is offered by one institution. Therefore, the information system environment should be reflected as if it were developed, managed and maintained by one body, and not be confused with separate systems owned by the university and the business partner. The discussions, below, present ideas by which information systems may reflect a standardised environment. These ideas also incorporate those of the students.

Centralising the decentralised information systems. One of the main frustrations highlighted by students was maintaining multiple login credentials. The experience was cumbersome and confusing, as the information systems are supported by two separate entities (the university and a business partner). Figure 5.4 represents students' experiences in using the information systems to support their research and learning. It describes decentralised usage patterns that affect students' receptiveness towards the information systems.

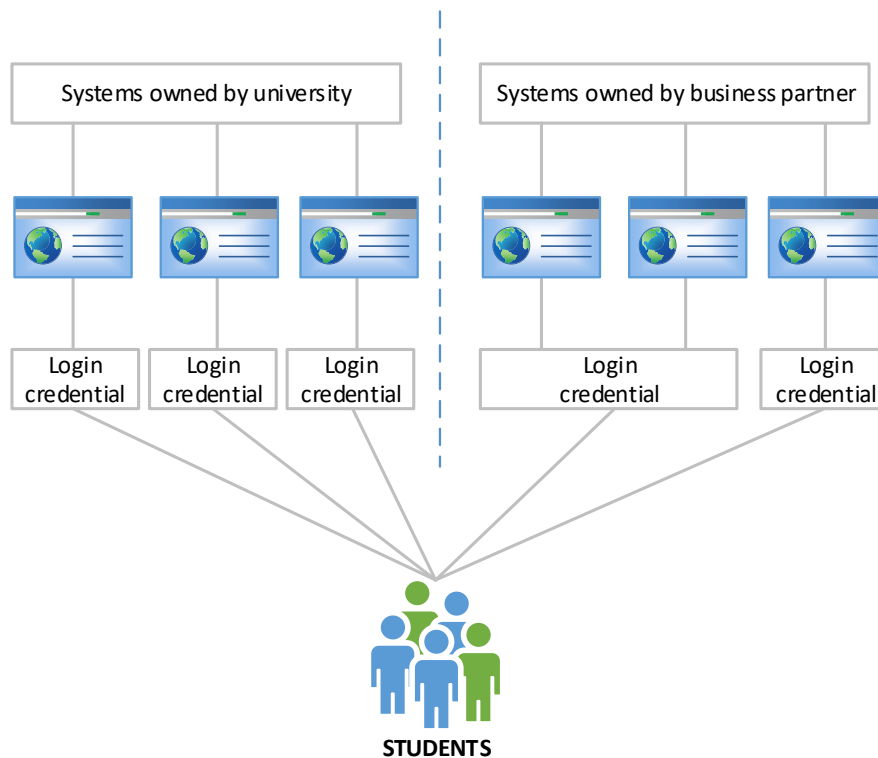


Figure 5.4: A decentralised usage pattern

The ideal solution is to consolidate all systems into one centralised portal that maintains one login credential, as shown in Figure 5.5. The complexities of using and maintaining multiple information systems burden the students. The university, the department and the business partner should work together to make the information systems look unified and standardised, representing one entity.

Usability principles suggest that a well-designed information system should reflect efficiency, consistency, standards and ease of use (Kirakowski & Cierlik, 2001). For students, a centralised information system would allow navigation from a single location, offer quick access to information, speed up decision-making, and improve students' overall experience. Most importantly, it would reduce the cognitive processing load and allow students to focus on learning and actual research work.

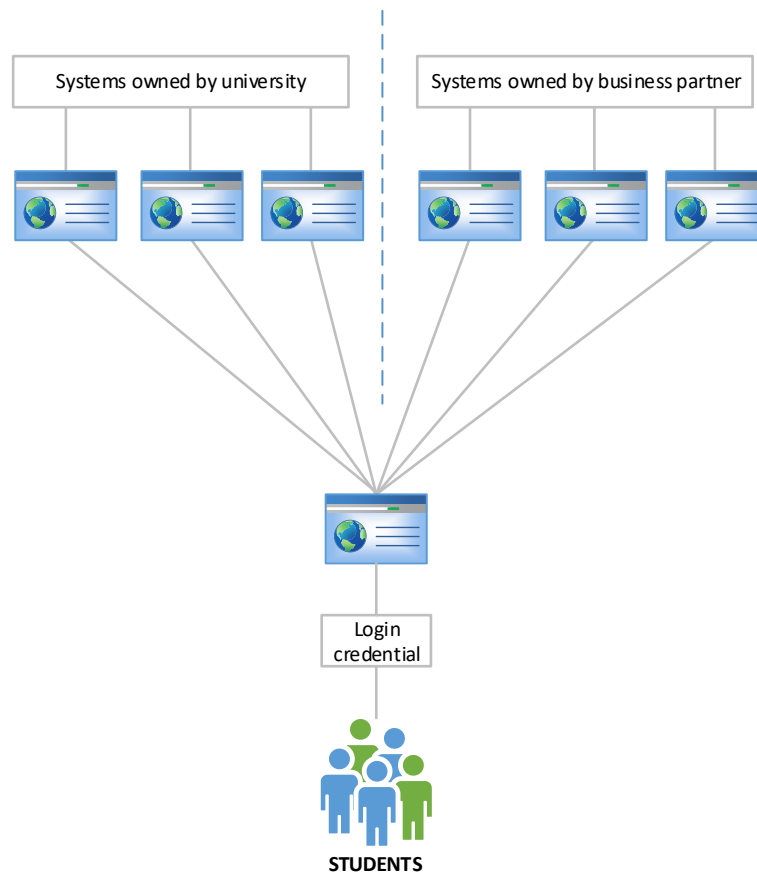


Figure 5.5: A centralised usage pattern

Customised and personalised learning analytics. Doctoral learning and research are complex and involve many progress phases. The findings revealed that the students' progress varies and that they rely on their self-initiative and support from the supervisors to progress. Due to different supervisory styles, the support can be very subjective. In the current practice, the students also record their progress (together with the supervisors' input) in an online reporting system that is reviewed by a panel of decision-makers. The accuracy of the information depends on human input. However, an automated reporting system could be introduced to help capture students' and supervisors' activity, process the data, and provide accurate reporting that is customised and personalised (Zilvinskis et al., 2017). Such a reporting system would have the ability to present learning analytics through a data dashboard (visual presentation of learning performance, metrics, and data points) that could be customised to meet the programmes' and the department's specific needs. Learning analytics can assist students, supervisors and the department in effective decision-making, owing to the ability of such analytics to monitor students' learning activities and to evaluate and predict students' performance (Zhong, 2016). Analytics also help supervisors and the department identify at-risk

students displaying unwanted learning behaviours and emotions. The data could help supervisors and the department take action and provide overall support. For students, valuable data about their learning patterns could be provided for reflection and improvement. The data reflect engaging and personalised learning experiences that could be used to reflect and identify areas of improvement. According to Wong (2017), learning analytics have mainly focused on on-campus students and have not addressed open and distance education. For standardised service provision, institutions should extend learning analytics to include learners from the online learning mode. The effort would require the involvement of the department offering the programme (an expert in learners and learning) and the IT department (an expert in data analytics).

Adding variety in information content format. Due to the massive volume of information, text-based content causes information overload and takes time to read and process. While text-based content can be impactful in communication, online content has experienced a shift in recent years, incorporating texts, images, audios and videos (multimedia) into the content. One student (Pre5) suggested incorporating videos to complement text-based information. Presenting information content in different formats benefits different types of learners. Students have different ways of learning. There are visual, auditory, reading-writing, and kinaesthetic learners who prefer varied content formats. Espinoza-Poves et al. (2019) claim that students adopt multimodal learning styles to perceive and process information. They also add that age significantly influence learning styles. Older students combine different learning styles to cater to different learning needs presented at different times. The above suggests that information content should include multiple formats, in order to cater to students with multimodal learning styles. A straightforward example is that the thesis processes and procedures could be presented in a visual process flow diagram (flowchart). Flowcharts provide a better way to communicate process logic and assist in identifying and analysing inefficiencies in processes; they also allow for a quick and better understanding of the processes. Figure 5.7 is an example of a process flow diagram. The effort would involve the department offering the programme, a content creator or designer, and the IT department.

Information that reflects thesis phases. Students highlighted that information in the systems is published at different locations, making information search activities cumbersome and frustrating. Students have very little time to explore information at various places, and when they cannot find the needed information, they stop the information search activity and use alternative information,

or seek help from their supervisors and other people. Information that is grouped by task and document type promotes easy access. Each thesis phase uses different processes, documents, tools, and support personnel. If information is grouped according to each phase, students will have instant access to important resources and require minimal support from supervisors and others in locating information. Figure 5.6 provides an idea of how doctoral students' information page could be structured. It does not cover all the necessary information, but it provides a bigger picture of the information arrangement. Its aim is to present structure, instant access, and a clear information flow.

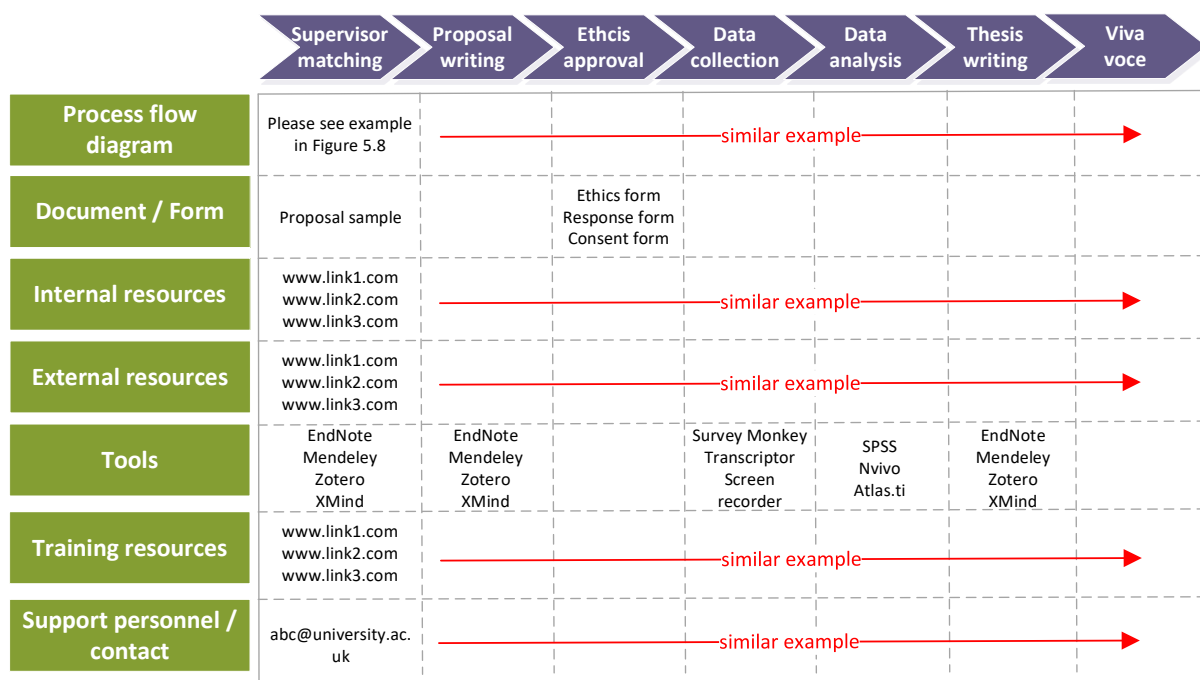


Figure 5.6: A centralised information structure reflecting each thesis phase

As shown in Figure 5.6, above, each thesis phase has a specific procedure that shows the step-by-step activity the students need to follow. For example, the supervisor matching phase requires the students to access supervisors' profiles, prepare an outline of the proposal, contact and discuss with prospective supervisors, and be assigned with a primary and secondary supervisor. The procedure involves several steps and parties. The swimlane process flow diagram shown in Figure 5.7 provides information on procedure activities and indicates the people involved in the procedure. The diagram also informs students of which documents will be needed and produced as a result of the procedure steps. Although the diagram may not accurately represent the actual procedure flow, it can be used as a guide from which to structure the procedure for easy and

quick understanding. Such an effort would require the involvement of the department offering the programme, a content creator or designer, or an information visualisation expert.

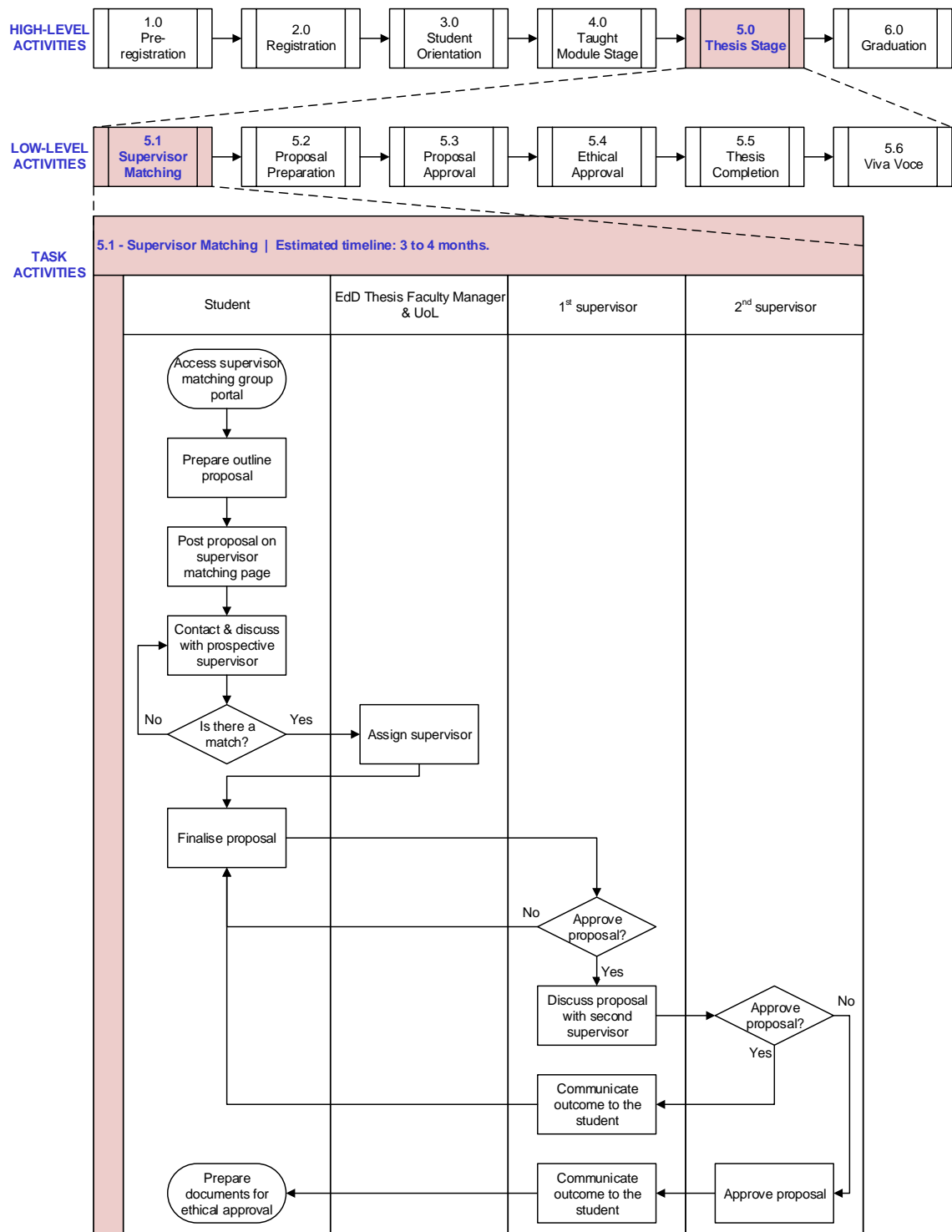


Figure 5.7: A sample of the supervisor matching procedure flowchart

5.4.3. Doctoral development through knowledge and skills acquisition

The findings suggested that doctoral learning develops the students' knowledge and skills. When students enter the thesis stage, they displayed different levels of knowledge and skills. Some were proficient in research, while others faced challenges. The differences in knowledge and skill level may be due to students' backgrounds, experiences and exposure in life, work and education settings. Doctoral research requires students to possess standard and common skills that are needed for the research work. For example, all students need to develop their writing, data collection, data analysis, research design and research presentation skills. Therefore, the use of various resources to support the students' knowledge and skills acquisitions is needed, as discussed below.

5.4.3.1. Student-to-student support towards knowledge and skills acquisition

The findings showed that several students (Pre2, Pre6, Pst3) expressed appreciation for the efforts taken by some students in sharing and providing tutorial sessions on the use of research tools. This scenario indicated that the student body consists of those who have different levels of knowledge and skills. As working professionals who are mostly in academic and professional development settings, the doctoral students possess unique knowledge, experience, and skills that could benefit other students. As such, online platforms could be created for students to offer tutorial/training sessions for other students who need to develop practical research skills. The sessions could include tutorials on reference management software, data analysis software, or using MS Word to finalise the thesis format, for example. While supervisors are the most critical figures in the students' doctoral study, they may not be able to offer practical help sessions to all students due to lack of time. The doctoral students are also busy adults, but perhaps there are those who are willing to contribute their time and effort towards students' progress and self-development. A needs analysis could be carried out to determine if such a mechanism would be welcomed. The effort could include, apart from existing students, alumni who have completed and acquired skills that would benefit existing students.

5.4.3.2. Links to massive open online courses (MOOCs) and training resources

The Internet provides rich resources to doctoral students. Public and private organisations from around the world are utilising the Internet to offer free massive open online courses (MOOCs) and paid training to doctoral students. These courses and training programmes utilise learning management systems by incorporating multimedia content and interactive exercises, assignments and quizzes. Many Ivy League universities and well-recognised institutions offer self-paced or schedule-based training or courses that are free or paid, advocated by top professors and professionals. The courses are often flexible and interactive. MOOCs offered by EdX, Udemy, Coursera, Udacity, Skillshare, and FutureLearn produce courses from university professors and experts in the field. These online courses are known for their flexibility, self-paced learning, improved virtual communication and collaboration, and broader global perspective. The doctoral programmes could utilise such courses as part of their thesis activity to support students' development and such an initiative would require the involvement of the department, and internal or external training or course providers.

5.5. Conclusion

The significant contribution to the study is the presence of information sharing, socialness of information behaviour and transformative learning. The online learning environment creates a significant need for students to interact with others to access information, discuss, learn, and create a learning environment that feels real. Information behaviour is significantly influenced by the information environment, in this case, the doctoral learning environment and the information support environment. As students interact within these environments, their individuality determines their actions and behaviour, and the richness of their information behaviour depends on their initiatives and the support of others.

Chapter 6 : Conclusion

Adult learners who are pursuing online education are not a homogenous group. However, the information behaviour of the students in the present study fits a generally accepted pattern. Where information is concerned, students need accurate, reliable, comprehensive, valid, quality and concise information. For information support services, students expect the services to be user-friendly, easy access, familiar, structured, centralised, customised and personalised. The principle of 'doing less' and 'gaining more' is important for adult learners who lack time to explore available resources. The responsibility of information providers is to work within their context while aiming to uphold the value of high-quality sources and resources. Practical lessons such as the usability of systems and resources, training, virtual learning spaces, and social interaction are important for these geographically disparate adult learners. The aim is to create a similar on-campus experience virtually while tailoring services (customisation and personalisation) to individuals, sub-groups and demographics.

6.1. Implications for practice

This study highlights the fact that the information behaviour of doctoral students is complex and has significant contributions to informing strategies surrounding information, information systems, information users and the information environment. It is, therefore, important for organisations to first understand the behaviour of information users surrounding the information environment, to formulate strategies that are focused on catering to the users' needs and behaviour patterns. The main implication for practice is to consider the proposed framework when designing, implementing and evaluating information strategy, and to consider its areas of contribution. The discussions, below, detail the implications of practice. Although the ideas presented are broad, the ideas surrounding information strategies share some common factors.

The fundamental value of information services lies in its information strategy. It focuses on what information is required and how information should be designed to fit the needs and behaviours of the information users. When the information format and presentation incorporate the use of text, video, audio, or graphics, they influence the cognitive processing, retention rate, and emotional

aspects of information users. Organisations that use information as their core service value should consider varied information formats and designs. Media-rich information sustains attention, cognitive load, emotion and learning performance (Chen & Wu, 2015). Effective information fulfils some basic criteria. Nadeau et al. (2012) claim that, for information to be effective, the information users must first have the basic knowledge level to understand the information content. Effective information also means the information conveys interrelatedness (is linked to other related information), relevance (fits the interest of users), usability (is readable and presentable), informs action (knowing the next step) and promotes differentiation (information offering unique perspectives) (Nadeau et al., 2012).

In support of the above, organisations that present information online should incorporate user interfaces that are usable. The approach focuses on the information users, such that products are likely to meet users' expectations and requirements within specific contexts. Fundamentally, information systems' interface must strive for clarity, interactivity, user control, easy navigation, consistency, visual hierarchies/structure, simplicity, consistency, accessibility, flexibility, and next-step clarity. When these principles are incorporated into interface design, information users are able to fully utilise the information systems at their optimum, focusing on their core task rather than navigating the system, and finally reducing the cognitive load (Faghieh et al., 2014; Peters, 2014; Reeves et al., 2002). The implication of such usage would impact the users' experience and produce positive impressions and acceptance towards the information system (Park & Lim, 2019), thus encouraging its use. For a more positive impact, information systems must accommodate personalisation and customisation trends, whereby the systems are intelligent enough to personalise contents with interface designs that fit the navigation patterns of information users.

The implications of the present study are not only limited to information systems design but are also important for any form of services where information is the core product. Organisations that provide information services must identify strategies that specify the information needed, the information publishing platform, and the information sources and resources befitting the users. Strategies should ensure that the organisation can strategise on information content, quality, ownership/custodianship, infrastructure, communication channels, and, most importantly, information governance (Bentley & Clarke, 2011).

Finally, the most important part of an information strategy is the information users. Organisations that provide information as a service must first understand the information users and their behavioural patterns surrounding information. The individuality and existing knowledge and skills of the information users must first be identified to ensure that they all possess the basic quality for successful information activities. Analysis of information users will result in understanding the kind of information needed, the skills in searching for information, the confidence levels, and the existing capabilities of the users in utilising information services to the optimum level. Understanding the users would help organisations develop strategies that focus on content and documentation creation, methods of presentation, tools to be incorporated into information services, portfolio development and strategic enablers (Corrall, 2008). These factors will ensure that services are compartmentalised to meet potential markets and to serve meaningful user groups that may have distinct yet similar characteristics. Strategic enablers can provide the necessary learning development tools and programmes that prepare the users to utilise information services as intended.

Information strategy is important for every organisation, as such strategy identifies crucial information to support the operations and decision-making in organisations. It refers to the long-term plan, in which organisations design and achieve business objectives in the management of data, information and knowledge. It is, therefore, crucial that organisations include information strategy as an integral part of the overall strategy.

6.2. Limitations

The limitations discussed in this section suggest that the present research is not without flaws. Research is about presenting what constitutes truth as interpreted by the researcher. While facts and evidence guided the interpretation of this research, the quality of the research is as good as the researcher's quality and capability. Acknowledging weaknesses and limitations is crucial to research growth and advancement. The four limitations presented herein promote further discussion and generate new ideas for future research.

First, the single case study was adopted in this research because of its flexibility and because it allows the researcher the ability to focus on specific students and real-life situations within an institution. However, the limitation of a single case study is that it only examines one group of doctoral students in one institution within one field of study – described as an embedded single-case study by Yin (2014). From an embedded single-case study, the research outcome cannot be generalised because it lacks comparability with other doctoral students' information behaviour in different institutional contexts. Furthermore, the properties surrounding this study's context focus on the highly non-traditional adult learners pursuing a practitioner doctorate in a purely online learning environment. Due to its narrowly focused context, the present study limits applicability and comparability to doctoral students in general.

Second, the research adopted the purposive sampling method to recruit the research participants. A set of characteristics guided the selection of the participants, where 15 students volunteered for the study (female = 14, male = 1). The unequal gender representation (14:1 ratio) limited the opportunity to compare female and male students' information behaviour. The result of this research represents the perspectives of female students who are the majority of the participants. As such, this study cannot claim to represent the student body accurately, as it could not compare gaps and learning outcomes between male and female students. It cannot confirm if gender has any significant influence on information behaviour.

Third, during the interview, students were asked to gauge their digital and information literacy skill levels: categorised as basic, intermediate or advanced level. The data relied on the students' perceptions of their own skills. As individuals, people form opinions about themselves. They perceive what they can and cannot do based on their understanding and perspectives. The measurement of students' information and digital literacy skills was not supported by recognised or well-acclaimed test instruments because it was beyond the scope of this research. The findings revealed that some students associated their information behaviour and learning limitations with their information and digital literacy skills, and the data were presented at a surface level. This relationship highlighted by students suggests that there is an opportunity to explore the area of information and digital literacy skills in the study of doctoral students' information behaviour.

Fourth, information seeking is one of the information behaviour components. It relates to information search actions that influence the outcome of the process. Data are limited to how students account for their information-seeking activities. While probing during interview sessions allowed for in-depth inquiry, the data on information-seeking activities could be enriched using the observation technique. When students seek information, they interact with people and information systems that involve motor movement and cognitive processing. However, due to geographical limitations, the observation technique was never an option. In an ideal situation, interviews and observation methods would garner richer data and a deeper understanding of students' information-seeking behaviour, especially pertaining to the user of the information system. The scope of information-seeking behaviour data in the present study only relied upon students' accounts of the activity. Employing the interview and observation methods would allow for independent research on information-seeking behaviour, which is the major contributing factor to information behaviour.

6.3. Opportunities for future research

The literature review and findings revealed a strong relationship between information behaviour and information users' individuality (internal and external attributes), learning outcomes, and information environment. The ties and interconnectedness between the elements offer potential opportunities to expand information behaviour research into several branches of concepts and context. The discussion, below, details each possible option.

6.3.1. Include other disciplines and institutions

The present study consists of participants who are registered to an online professional doctorate programme at a university in the United Kingdom. For the study of information behaviour to reflect more accurate patterns at the doctoral level, the research should consider doctoral students (professional and traditional doctorate) from a broader range of disciplines and higher education institutions. Investigating online doctoral learners beyond the border of a university in the United Kingdom (i.e., worldwide) could determine differences between institutional structure and practices in other disciplines. The scope could provide a more general view of information behaviour amongst online doctoral students.

6.3.2. Expand from cross-sectional to a longitudinal study

The sample population of the present study was divided into two groups of doctoral students. The first group consisted of students at the pre-ethical approval phase who experienced supervisor matching, writing of the proposal, designing the research and preparing for ethics. The second group consisted of students at the post-ethical approval phase (ethics application approved) who experienced data collection, data analysis, and completing the thesis. When comparing both groups, the findings reveal that their information behaviour was different. The difference was related to the kind of information needed, how learning evolved, how skills were developed and used, and how knowledge was applied. The differences suggested that, over time, the students' information behaviour patterns changed, research and learning skills grew from novice to a higher level, and the nature of 'self' developed and transformed into a new structure. These changes, over a period of time, suggest that a longitudinal study could be carried out to identify changes in students' information behaviour, learning and growth. The longitudinal research could branch out into different information behaviour elements, such as doctoral learning development and various knowledge and skills acquisition stages. A longitudinal study would identify the reasons why and how students' development shifts over time.

6.4.3. Add teaching domain into the study

The findings showed that, when doctoral students use relevant information for their research, significant learning takes place. It shows the type of learning that resulted in different process steps, knowledge domains, learning styles, and learner types. However, learning is also a product of teaching. Therefore, the study of information behaviour should look at the broader context, which includes the teaching and learning domains. Such a study would allow higher education institutions to identify and formulate teaching and learning strategies that impact education delivery.

6.3.4. The connection between emotion and information behaviour

The emerging themes from the three research questions indicated the role of emotions in the students' information behaviour cycle, learning and use of information support services. The themes

discussed positive and negative emotions that occurred at different times. Positive emotions resulted in better work progress, acceptance of the new identity, acceptance of self, and identifying new research and learning strategies. Negative emotions, however, create barriers with the information environment, barriers in using the information support services, barriers in knowledge and skills acquisition, and barriers in research development and progress. The research in this area would allow institutions, departments or programmes to recognise critical areas surrounding the affective domain and identify tools or strategies for maintaining positive emotions or for changing negative to positive emotions in the education setting.

6.3.5. A balanced sample population

One of the limitations of this research is the unequal representation of female and male students (14:1 ratio) that could not represent the student body accurately. Therefore, future research of this nature must ensure an equal representation of both genders. The equal representation would allow for more accurate comparisons in information behaviour research. It will help identify whether the gender variable influences students' information behaviour and, if it does, to what extent, and which areas have the most significant impact and outcomes.

6.3.6. Detailed analysis of digital and information literacy skills that feed into information behaviour study

The digital and information literacy skills (henceforth called literacy skills) level describe a set of skills that enable students to seek, find, evaluate, utilise, compose and cite high-quality information quickly and efficiently using digital platforms. The skills' description is elaborate and cannot be represented by basic, intermediate, and advanced levels. It requires a more holistic form of analysis that uses recognised or well-acclaimed test instruments to gauge accurate skill level. The detailed and accurate representation of students' literacy skills could generate new variables, identify relationships and inform information behaviour outcomes. The study could also help identify potential training needed by students to support their doctoral learning.

6.3.7. Adding observation into the information-seeking behaviour data collection

In addition to the interview method, the information-seeking behaviour data collection should incorporate the observation method, because it would allow for a more accurate description of the behaviour. Observation would show how students use various information systems and portals to search for information. It would show which search methods were used, what search results the systems generate, and which parts of the information systems are considered hotspots. 'Hotspots' is a concept used in user interface design to study information users' click habits in an information system (usually shown on the computer screen). The observation technique would provide detailed steps in information seeking that could be used to improve the usability and interface design of the information systems. It would also extend the scope of information behaviour research into other disciplines (e.g., computing and information systems design).

6.4. Autobiographical reflection

When I reflected on my doctoral journey, I tried to recall my initial motivation for pursuing this doctoral degree. At the centre of it all lies this person (the 'self') who is constantly changing as a result of continuous reflection. The change reminds me of a quote from Foucault that says:

'I don't feel that it is necessary to know exactly what I am. The main interest in life and work is to become someone else that you were not in the beginning.'

(Foucault, 1982, as cited in Marshall, 1996, p. 10)

Foucault's statement reflects my positioning in life and in pursuing the doctoral study. The doctoral learning taught me that I can change myself and that I can develop alternative paths. I was brought up with conventional thinking, believing that a doctoral degree promises 'better career opportunities'. Now that I am at the end of the journey, I do not even know what that entails. What I know is, my change is real and gradual. As I learn, I continue to refine myself through my speech, thoughts, deeds and actions. People treated me differently. It was as if there was this new form of

respect associated with the word 'doctorate'. My opinion began to matter among colleagues and friends. I am beginning to accept this new identity and self-worth after many internal struggles and conflicts.

As in most lives, much of what is lived is neither anticipated nor planned. The significant change I made while pursuing my doctoral degree was to leave a financially viable academic position in the Middle East to pursue a more positive and meaningful vocation. Unfortunately, the Covid-19 pandemic affected everyone around the world. It crippled freedom to move, the economy, people's livelihood, and the well-being of many. From a hopeful state, I became fearful of my uncertain and unknown future. Like that of most people, my initial reaction was to worry, but, gradually, my worry turned into accepting the reality, and accepting the reality provided clarity. If I should find time to test my doctoral learning value, then this is the time.

I realised that doctoral learning developed my mind and developed a more profound perspective that transformed my heart and soul. I gained a more profound sense of my 'self' that understands there is a greater power at work and that it is real, and no amount of force within my human capacity can stop or change it. I know I cannot change what is going on in this world, but I can change my perspectives. Would I be able to have this deep sense of understanding had it not been for all the learning in my doctoral study? Perhaps yes or no, but the journey has taught me about patience, perseverance, the reality of fear, the reality of failure, and, most importantly, the reality of life. We learn, embrace and assume a positive perspective when we need to. There are many alternative paths to how we view our reality. We just need to know which perspective to use in order to fit a specific context.

The worst part of doctoral learning is when you are continually practising reflection, and becoming very critical of your work and yourself. At times, moments of self-questioning and self-talks turned into self-doubt. I doubted my ability, writing, arguments, and every part of my thesis, so much so that there were long periods of numbness and paralysis. At one point, my progress stopped because I questioned and self-sabotaged my own work. The ability that one acquires as a result of doctoral learning is tremendous. There were moments when I was sure I would never reach the end of the journey. But then, I was reminded of how much more I would gain if I would just persist. I looked for renewed motivations and remained steadfast despite the uncertainties surrounding my future.

My doctoral experience is my ever-changing 'self'. We often take ourselves for granted and think we know all there is to know about ourselves. It is through the struggle of research, learning and life that I gained new perspectives. They call it 'troublesome knowledge' and 'crossing the threshold'; simple terminology, but complex reality. Adversity is the best teacher. The doctoral journey has been transformative. In retrospect, my professional and personal journey allowed me to see how transformative practice contributed to the change in 'self'. The principles behind this writing are deeply rooted in reflexivity, vulnerability, uncertainty, and acceptance. To a certain extent, I cannot change the fate of my life, but I can change the angle from which I look at it. That is what the doctoral journey has taught me.

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Appendix A: Declaration of Academic Integrity



PGR Policy on Plagiarism and Dishonest Use of Data – Annexe 1

PGR DECLARATION OF ACADEMIC INTEGRITY

NAME (Print)	P. Mageswary Mudaliar
STUDENT NUMBER	H00030760
SCHOOL/INSTITUTE	Centre of Lifelong Learning
TITLE OF WORK	Exploring the Information Behaviour of Online Doctoral Students at Thesis Preparation Stage

This form should be completed by the student and appended to any piece of work that is submitted for examination. Submission by the student of the form by electronic means constitutes their confirmation of the terms of the declaration.

Students should familiarise themselves with Appendix 4 of the PGR Code of Practice: PGR Policy on Plagiarism and Dishonest Use of Data, which provides the definitions of academic malpractice and the policies and procedures that apply to the investigation of alleged incidents.

Students found to have committed academic malpractice will receive penalties in accordance with the Policy, which in the most severe cases might include termination of studies.

STUDENT DECLARATION

I confirm that:

- I have read and understood the University's PGR Policy on Plagiarism and Dishonest Use of Data.
- I have acted honestly, ethically and professionally in conduct leading to assessment for the programme of study.
- I have not copied material from another source nor committed plagiarism nor fabricated, falsified or embellished data when completing the attached material.
- I have not copied material from another source, nor colluded with any other student in the preparation and production of this material.
- If an allegation of suspected academic malpractice is made, I give permission to the University to use source-matching software to ensure that the submitted material is all my own work.

SIGNATURE: **P. Mageswary Mudaliar.**

DATE: **2 December 2016.**

Appendix B: Ethical Approval



Dear PMageswary Mudaliar

I am pleased to inform you that the EdD. Virtual Programme Research Ethics Committee (VPREC) has approved your application for ethical approval for your study. Details and conditions of the approval can be found below.

Sub-Committee: EdD. Virtual Programme Research Ethics Committee (VPREC)

Review type: Expedited

PI:

School: Lifelong Learning

Title: Exploring the Information Behaviour of Online Doctoral Students at Thesis Preparation Stage

First Reviewer: Dr. Lucilla Crosta

Second Reviewer: Dr. Kalman Winston

Other members of the Committee: Dr. Martin Gough, Dr. Mariya Yukhymenko, Dr. Ewan Dow, Dr. Victoria O' Donnell.

Date of Approval: 3rd November 2016

The application was APPROVED subject to the following conditions:

Conditions

- 1 Mandatory M: All serious adverse events must be reported to the VPREC within 24 hours of their occurrence, via the EdD Thesis Primary Supervisor.



This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified. If it is proposed to make an amendment to the research, you should notify the Sub-Committee by following the Notice of Amendment procedure outlined at <http://www.liv.ac.uk/media/livacuk/researchethics/notice%20of%20amendment.doc>.

Where your research includes elements that are not conducted in the UK, approval to proceed is further conditional upon a thorough risk assessment of the site and local permission to carry out the research, including, where such a body exists, local research ethics committee approval. No documentation of local permission is required (a) if the researcher will simply be asking organizations to distribute research invitations on the researcher's behalf, or (b) if the researcher is using only public means to identify/contact participants. When medical, educational, or business records are analysed or used to identify potential research participants, the site needs to explicitly approve access to data for research purposes (even if the researcher normally has access to that data to perform his or her job).

Please note that the approval to proceed depends also on research proposal approval.

Kind regards,

Lucilla Crosta

Chair, EdD. VPREC

Appendix C: Interview Protocol for Pilot Study

INTERVIEW PROTOCOL PILOT STUDY

STUDENTS' INFORMATION BEHAVIOUR

Participants' background:

1. Could you please provide a few information about yourself such as:
 - a. Your age group (Under 25 / 26-35 / 36-45 / 46-55 / above 56).
 - b. Your occupation.
 - c. area of specialization
 - d. Your country of origin
 - e. Your spoken language
 - f. Your level of Internet competency.
 - g. Your thesis phase (before / after the approval of the proposal).

Information Needs:

2. What kinds of information do you frequently require or look for at the thesis preparation stage?
3. When and why do you usually require/need such information?

Information Seeking:

4. How do you seek or search for the required information?
5. Could you share your experiences while using the university's information support system when seeking for information?
6. How does your ability to search or not able to search for information affect your progress in the thesis stage?
7. How does your self-efficacy influence your information seeking behaviour at the thesis stage and vice versa?

Information Use:

8. When you have gathered the information you require, how do you then filter/process the information to determine its usefulness?

INFORMATION SUPPORT SERVICES:

1. How would you describe the current information support services provided by the university for the EdD programme?
2. How sufficient is the information provided by university in helping you progress in your thesis preparation stage?
3. What kind of challenges do you face with the information provided by the current information support services?
4. In your opinion, how can the current information support services be improved to fit your needs as a thesis student?
5. Describe your idea of an ideal information support service that should be provided by the university?

Appendix D: Final Interview Protocol for Students

INTERVIEW PROTOCOL FOR THESIS STUDENTS

DEFINITION

Below are the definitions of information and information support services within the context of my research. It is meant to help ease your understanding and answer the interview questions within the research scope.

Information:

In this research, information refers to the information needed by a thesis student to successfully move forward in the thesis preparation stage. The information needed may be related to the formal thesis preparation processes itself in order to complete the necessary activities/task in the thesis stage. It could also be any forms of information related to research that builds a student's knowledge, thought-processes, learning skills, competencies, and self-efficacy to grow and progress as a student and a researcher throughout the thesis preparation stage.

Information support services

In this research, information support services refer to the overall support deemed necessary for a thesis student to complete the required task in the thesis preparation stage, or to develop the individual student and researcher. The support may encompass primary or secondary sources such as, books, websites, information portal/system, and people (fellow students, supervisors, thesis faculty manager, community of researchers, community of practice, etc.) through formal or informal channels. They are sources of information support that help students to successfully progress into different phases of the thesis stage, and into different phases of growth as a student and a researcher.

INTERVIEW QUESTIONS

STUDENTS' INFORMATION BEHAVIOUR

Participant attribute:

1. Could you please provide a few information about yourself such as:
 - a. Your age group (Under 25 / 26-35 / 36-45 / 46-55 / above 56)
 - b. Your occupation.
 - c. Area of specialization.
 - d. Your country of origin.
 - e. Your spoken language.
 - f. Your level of Internet competency (Basic / intermediate / advance)
 - g. Your thesis phase (Pre- or post-proposal approval stage)

Information Needs:

2. What kinds of information do you frequently require or look for at the thesis preparation stage, or as a research student?

Probes:

- *Information provided by the university to progress in the thesis stage.*
- *Information required to help with research (to enhance knowledge, skills, competency, confidence level, etc.) that are self-initiated.*

3. When and why do you usually require / need such information?

Probes:

- *The trigger point of knowing when information is required and important.*
- *The reason for needing the information / the scenario.*

Information Seeking:

4. How do you seek or search for the information you need?

Probes:

- *The method of inquiry (the search for information - the action itself).*
- *Sources of information (primary and secondary). From where? From who?*

5. How has your ability impacted your search for the required information to progress in the thesis preparation stage, or to develop yourself as a student and a researcher?

Probes:

- *The influence of existing knowledge to take the action to create new knowledge.*
- *The influence of existing knowledge, skills, and competencies to initiate the action to search for information or to close existing gaps.*
- *The influence of self-efficacy / self-confidence / self-initiative towards searching for information.*
- *The influence of self towards wanting more information; to progress.*

6. Describe your experiences in this research journey that has impacted your learning as a student and a researcher.

Probes:

- *Learning experiences by interacting (seeking and using) with information.*
 - *Personal growth as a students and a researcher through information found.*
 - *Learning through gathered information that influences knowledge, skills, and competencies.*
 - *Changes – as a person (attitude, character, criticality, thinking, maturity, etc.) and as a professional (at work, in a specific field, in a career, etc.)*

Information Use:

7. How do you process and use the information that you have found?

Probes:

- *Determining the usefulness of information to progress (e.g. method of filtering, decision-making, and thought-process).*
- *Determining the usefulness of information to close existing gaps (knowledge, skills, and competencies).*
- *Deciding on the way information is use or applied to progress.*
- *Reaction towards information that are not useful.*

8. When you've found information throughout your thesis stage, do you share or discuss the information with others (your peers, your cohort member, your colleagues, etc.)? If yes, how has that discussion about the information you found impacted you?

Probes:

- *The value of that information when shared with others.*
- *How that sharing process develops your understanding about the information.*
- *What it does to your thought-process.*

Overall:

9. How has your own learning philosophy and motivation support your growth as a student and a researcher?

Probes:

- *Be beliefs, principles and/or values related to personal learning.*
- *The inner desire or motivation to want to grow and progress, or to want to complete the thesis.*

INFORMATION SUPPORT SERVICES:

10. Please share your insights and experiences on the information support services provided by the university to help you progress as a student and as a researcher?

Probes:

- *Insights and experiences from information sources provided by the university (e.g. information systems, supervisor, thesis support personnel, etc.).*
- *Information accuracy, accessibility, ease of use, user-friendliness, format, and presentation (provided by the university).*
- *Communication channels provided by the university to gather required information.*
- *Pro and cons / challenges*

11. What is your idea of an ideal information support services?

Probes:

- *An idea of an ideal information support services that you would like to see provided by the university.*
- *An idea of an ideal "you" as a source of support to learn, grow and develop yourself as a student and a researcher.*
- *Combination of formal and informal support.*

WRAP-UP:

12. I have basically covered all the questions I wanted to ask. Do you have anything else you would like to add?

Probes:

- *Any other information deemed useful but not covered by the previous questions.*

Appendix E: Final Interview Protocol for Supervisors

INTERVIEW PROTOCOL FOR SUPERVISORS

INTRODUCTION

Thank you for participating in this research. As explained in the e-mail, the purpose of this interview is to understand your information behaviour as an online doctoral student at the thesis preparation stage. I hope the information you provide will help inform HEIs to design information provided according to target user group information behaviour in terms of clarity, content and context that appeals to the target group. I would also like to seek your personal perspectives and experience while interacting with information provided by the university in the hope that it will help to inform ideas and improvement initiatives on the current information support services at the thesis stage.

Your identity and the information gathered from this interview will be kept confidential. The interview may last about 40 minutes and if under any circumstances you wish to withdraw from the interview, you may do so at any time. The interview session will be recorded to assist in the transcription. The notes and recording will be kept in a secured storage space. A copy of the transcript will be provided to you for verification and validation purposes. Before we begin the interview, I would like to highlight the meaning of information and information support services used in this research.

Information:

In this research, information refers to the information needed by a thesis student to successfully move forward in the thesis preparation stage. The information needed may be related to the formal thesis preparation processes itself in order to complete the necessary activities/task in the thesis stage. It could also be any forms of information related to research that builds a student's knowledge, thought-processes, learning skills, competencies, and self-efficacy to grow and progress as a student and a researcher throughout the thesis preparation stage.

Information support services

In this research, information support services refer to the overall support deemed necessary for a thesis student to complete the required task in the thesis preparation stage, or to develop the individual student and researcher. The support may encompass primary or secondary sources such as, books, websites, information portal/system, and people (fellow students, supervisors, thesis faculty manager, etc.) within the university environment. They are sources of information support that help students to successfully progress into different phases of the thesis stage, and into different phases of growth as a student and a researcher.

INTERVIEW QUESTIONS

STUDENTS' INFORMATION BEHAVIOUR

Information Needs:

1. How many thesis students do you currently supervise?
2. Could you share your insights and experiences on your thesis students' need for information at the thesis stage?

Probes:

- *The frequency of inquiries received from the thesis students.*

- *Their reason for needing the information (the why).*
- *The types of information needed by the thesis students.*
 - *At pre- and post-ethical approval stage.*
 - *Others (to give examples).*

3. How do you identify your thesis students' information needs?

Probes:

- *The reason for needing the information (the why).*
- *The scenario that triggers the information need (the what and when).*

Information Seeking:

4. Could you share your insights and experiences on your thesis students' information seeking behavior?

Probes:

- *Their method of communication to seek for information.*
- *The interaction between the supervisor and the students on request and provision of information.*
- *Their specific information seeking behaviour/patterns.*

5. Could you discuss your experiences while seeking information for, or on behalf of your thesis students?

Probes:

- *The process of searching or seeking information.*
- *The method of inquiry (the search for information - the action itself). Do you search for them? Do you direct them to the source(s)?*
- *Sources of information (primary and secondary). From where? From who?*
- *The delivery of the information to the thesis students.*
- *The strength and challenges of sourcing for information within the university information environment.*

6. From your experience(s) or observation(s), how has your role as one of the information support sources impact your thesis students' progress?

Probes:

- *Students' development by interacting (seeking and using) with information through their supervisor.*
 - *Learning through gathered information that influences their knowledge, skills, and competencies.*
 - *Growth as student-researcher through information used.*
 - *Personal changes (attitude, character, criticality, thinking, maturity, etc.).*
 - *Students' self-efficacy.*

Information Use:

7. How do you process the information you've gathered to identify its usefulness for your thesis students?

Probes:

- *Determine the usefulness of information to provide to students.*
 - *Method of filtering.*
 - *Decision-making process.*

8. Are there opportunities to share or seek information amongst thesis supervisors or others? Please discuss.

Probes:

- *Sharing of information with other supervisors / colleagues.*
- *The impact of sharing the information.*
- *The reason for sharing (why).*
- *The availability of a platform to share the information.*
- *The existence of information sharing culture between students and supervisors, and among peers.*

Overall:

9. Could you share your experiences on your role as one of the information support sources?

Probes:

- *The interaction between the supervisor and the students within the information environment.*
- *The impact of the interaction for the supervisor and the students.*
- *The challenges of the role as an information support source (lessons learnt).*
- *Continuous improvement efforts undertaken.*

INFORMATION SUPPORT SERVICES:

10. Could you share your insights and experiences on the information support services provided by the university?

Probes:

- *The availability of information.*
- *The information platform or the information system, as sources of information.*
- *The information provision to support your role as one of the information support sources.*
- *The information accuracy, accessibility, ease of use, user-friendliness, format, and presentation (provided by the university).*
- *Communication channels provided by the university to gather required information.*
- *Strengths and weaknesses.*

11. In your opinion, what is your idea of an ideal information support services?

Probes:

- *An idea of an ideal information support services to help you support your thesis students.*
- *Information support services related to the following:*
 - *Information system / platform.*
 - *Information channels.*
 - *Information accuracy / ease of use.*
 - *Information format / representation.*
 - *Information support (in general)*

WRAP-UP:

12. I have basically covered all the questions I wanted to ask. Do you have anything else you would like to add?

Probes:

- *Any other information deemed useful but not covered by the previous questions.*

Appendix F: Final Interview Protocol for Thesis Manager

INTERVIEW PROTOCOL FOR THESIS MANAGER

INTRODUCTION

Thank you for participating in this research. As explained in the e-mail, the purpose of this interview is to understand your information behaviour as an online doctoral student at the thesis preparation stage. I hope the information you provide will help inform HEIs to design information provided according to target user group information behaviour in terms of clarity, content and context that appeals to the target group. I would also like to seek your personal perspectives and experience while interacting with information provided by the university in the hope that it will help to inform ideas and improvement initiatives on the current information support services at the thesis stage.

Your identity and the information gathered from this interview will be kept confidential. The interview may last about 40 minutes and if under any circumstances you wish to withdraw from the interview, you may do so at any time. The interview session will be recorded to assist in the transcription. The notes and recording will be kept in a secured storage space. A copy of the transcript will be provided to you for verification and validation purposes. Before we begin the interview, I would like to highlight the meaning of information and information support services used in this research.

Information:

In this research, information refers to the information needed by a thesis student to successfully move forward in the thesis preparation stage. The information needed may be related to the formal thesis preparation processes itself to complete the necessary activities/task in the thesis stage. It could also be any forms of information related to research that builds a student's knowledge, thought-processes, learning skills, competencies, and self-efficacy to grow and progress as a student and a researcher throughout the thesis preparation stage.

Information support services

In this research, information support services refer to the overall support deemed necessary for a thesis student to complete the required task in the thesis preparation stage, or to develop the individual student and researcher. The support may encompass primary or secondary sources such as, books, websites, information portal/system, and people (fellow students, supervisors, thesis faculty manager, etc.) within the university environment. They are sources of information support that help students to successfully progress into different phases of the thesis stage, and into different phases of growth as a student and a researcher.

INTERVIEW QUESTIONS

STUDENTS' INFORMATION BEHAVIOUR

Information Needs:

1. How many thesis students do you currently supervise?
2. Could you discuss the role of a thesis faculty manager in terms of providing support to the students, the supervisor, and the EdD programme?

Probes:

- *General support.*
- *Information support*

3. Could you discuss the thesis students' and supervisors' need for information?

Probes:

- *The frequency of inquiries received from the thesis students.*
- *Their reason for needing the information (the why).*
- *The types of information needed by the thesis students.*
 - *At pre- and post-ethical approval stage.*
 - *Others (to give examples).*

4. From your experiences, had there been times when you had to identify the information needs of the students and the supervisors, without them asking?

Probes:

- *The reason for needing the information (the why).*
- *The scenario that triggers the information need (the what and when).*

Information Seeking:

5. Could you share your insights and experiences on the thesis students' and supervisors' information seeking behavior?

Probes:

- *Their method of communication to seek for information.*
- *The interaction between the thesis faculty manager with the students and supervisors on request and provision of information.*
- *Their specific information seeking behaviour patterns.*

6. Could you discuss your experiences while providing information for the thesis students and supervisors?

Probes:

- *The process of searching or seeking information.*
- *The method of inquiry (the search for information - the action itself). Do you search for them? Do you direct them to the source(s)?*
- *Sources of information (primary and secondary). From where? From who?*
- *The delivery of the information to the thesis students.*
- *The strength and challenges of sourcing for information within the university information environment.*

7. From your experience(s) or observation(s), how has your role as one of the information support sources impact the thesis students and supervisors?

Probes:

- *Students' development by interacting (seeking and using) with information through their supervisor.*
 - *Learning through gathered information that influences their knowledge, skills, and competencies.*
 - *Growth as student-researcher through information used.*
 - *Personal changes (attitude, character, criticality, thinking, maturity, etc.).*
 - *Students' self-efficacy.*

You are also the creator or provider of information, how do you sources for information to become the finormation provider.

Information Use:

8. How do you process the information you've gathered to identify its usefulness for the

students and supervisors?

Probes:

- *Determine the usefulness of information to provide to students.*
 - *Method of filtering.*
 - *Decision-making process.*

9. Could you discuss the information sharing environment among the thesis support faculty, to support the students?

Probes:

- *Sharing of information with other supervisors / colleagues.*
- *The impact of sharing the information.*
- *The reason for sharing (why).*
- *The availability of a platform to share the information.*
- *The existence of information sharing culture between students and supervisors, and among peers.*

Overall:

10. Could you share your experiences on your role as one of the information support sources?

Probes:

- *The interaction between the supervisor and the students within the information environment.*
- *The impact of the interaction for the supervisor and the students.*
- *The challenges of the role as an information support source (lessons learnt).*
- *Continuous improvement efforts undertaken.*

INFORMATION SUPPORT SERVICES:

11. Could you share your insights and experiences on the information support services provided by the university?

Probes:

- *The availability of information.*
- *The information platform or the information system, as sources of information.*
- *The information provision to support your role as one of the information support sources.*
- *The information accuracy, accessibility, ease of use, user-friendliness, format, and presentation (provided by the university).*
- *Communication channels provided by the university to gather required information.*
- *Strengths and weaknesses.*

12. In your opinion, what is your idea of an ideal information support services?

Probes:

- *An idea of an ideal information support services to help you support your thesis students.*
- *Information support services related to the following:*
 - *Information system / platform.*
 - *Information channels.*
 - *Information accuracy / ease of use.*
 - *Information format / representation.*

WRAP-UP:

13. I have basically covered all the questions I wanted to ask. Do you have anything else you would like to add?

Probes:

- *Any other information deemed useful but not covered by the previous questions.*

Thank you for your time and for sharing your perspectives and experiences. I will provide you with a copy of the transcript to see if you would agree or disagree on what we have discussed, and confirm the content. Should I need further clarification, may I get back to you? In the meantime, please feel free to contact me should you have any additional comments, questions, or concerns. Thank you once again. I appreciate your participation.

Appendix G: Analysis and Comparison of Information Behaviour Frameworks and Theories

No.	Designer of Model (By year)	Components or Elements in the Framework	Strength	Limitation
1.	Wilson (1981)	Environment (work, social-cultural, politico-economic environment, and physical environment) Social role (work role, and performance level) Person (physiological, affective, and cognitive needs) Barriers Information-seeking behaviour	Provides a set of hypotheses that are testable. Describe the affective aspect of information users.	All the hypotheses are implicit, not explicit.
2.	Wilson (1981)	Information user Need Information-seeking behaviour Demands on information system (success/failure) Demands on other information sources (success/failure) Information exchange Other people Information transfer Information use Satisfaction or non-satisfaction	Provides the process and action of information user. The model was derived from actual analysis of human information behaviour, not from theory proposed by other	Does not suggest causative factor in information behaviour. Does not provide hypotheses to be tested.
3.	Dervin (1998)	Situation Gap Outcome	Provides a way of question to reveal existing challenges of information service.	Does not suggest causative factor in information behaviour. Does not provide hypotheses to be tested.
4.	Ellis (1989) Ellis, Cox, and Hall (1993)	Starting Browsing / chaining / monitoring Differentiating Extracting Verifying Ending	The model was designed based on empirical research. Adopts a user-centred, not a system-based approach. The model has been tested.	Does not describe the affective aspect of information users.

5.	Kuhlthau (1991)	<p>Stage: Initiation Selection/exploration Formulation Collection Presentation</p> <p>Activity: Recognise Identify/formulate Gather Complete</p>	<p>A general model. Describes the affective experience of a person. The model has been tested. Provides detailed analysis of the stages in the active search for information. Adopts a user-centred, not a system-based approach.</p>	Does not describe the affective aspect of information users.
6.	Wilson (1997)	<p>Context of information need (person-in-context) Activating mechanism (stressing/coping theory) Intervening variables (psychological, demographic, role-related/interpersonal, environment, source characteristics) Activating mechanism (risk/reward theory, social learning theory – self-efficacy) Information seeking behaviour (Passive attention, passive search, active search, ongoing search) Information processing and use</p>	<p>A general model. Describe the affective aspect of information users. Explains the fundamental aspects of human behaviour. An expansion and inclusion of other theoretical model. A richer source of hypotheses. The model has been tested.</p>	Does not provide a resolution loop or feedback loop.
7.	Wilson (1999)	<p>Problem identification Problem definition Problem resolution Solution statement</p>	<p>Considers problematic situation. Add an uncertainty resolution loop. Adopts a user-centred, not a system-based approach.</p>	Does not describe the affective aspect of information users.
8.	Niedźwiedzka (2003)	<p>Identification of information need Decision to seek information Information seeking performed by the user Information seeking performed by formal/informal intermediaries Own knowledge and reference collection Computerised search systems Information centres, libraries, etc.</p>	<p>Information seeking involved delegated activities through intermediaries. A modification of Wilson's general model.</p>	Does not describe the affective aspect of information users.

		Own knowledge and reference collection Selection and processing of information by intermediaries Selection and processing of information by user		
9.	Fisher (2005)	Information need Information seeking Information giving Information use Information ground (context rich, temporal setting, instrumental purpose, social types, social interaction, informal and formal information flow, and alternative forms of information use)	Provides the process and action of information user.	Does not provide hypotheses to be tested. Does not describe the affective aspect of information users.
10.	Godbold (2006)	Existing knowledge (<i>K</i>) Activating mechanism The gap New knowledge (<i>K'</i>)	Provides a multi-directional progression of a person. Provides the process and action of information user.	Does not describe the affective aspect of information users.