“Cognitive Invisibility” of Postgraduate Students’ Information Seeking on the Web: a Test of Mansourian’s Model

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Abstract

Background The model of “cognitive invisibility” has been created by Yazdan Mansourian since 2006 in his thesis. This framework is about users’ subjective cognitive aspects and their conceptualisations of success and failure in information seeking on the web. Over a decade, the development of the Internet, search engines and Internet connection facilities has transformed people’s information seeking behaviour, along with their relationship with web searching. It is therefore necessary to test the model to see how it can address changes.

Aim The aim of the project is to understand how the model of “cognitive invisibility”, mainly proposed by Yazdan Mansourian in his thesis and a set of published journal articles, is manifested in search experiences, especially task situations, described by postgraduate students.

Methods The study adopted a qualitative method, using semi-structured interviews to investigate the cognitive dimensions of searching. Five postgraduate taught students who have studies one year in School of Education have been interviewed. Thematic analysis has been used in data analysis. A set of a priori codes were identified based on four key research around task situations in information seeking. Inductive codes were identified to supplement the a priori codes during analysis of the interview data.

Results A set of literature around success and failure in was identified in the study. People’s successful and failed searching experiences were categorised using Mansourian’s model. The relationship between task factors and the model has been discussed in detail. More importantly, a revised model has been presented to address factors of task situations and transformations from search failures to search successes.

Conclusion It is discovered that there are some links between task situations of information seeking and the zones, success & failure types in the model of “cognitive invisibility”. Tasks that are related to everyday life search, entertainment search, fact finding, routine search and tasks that include information evaluation as strategies are more likely be categorised in the bright zone, “anticipated success”. Tasks that are categorised in the veiled zone, “unexpected failure” are all academic searches, and are linked to accessing issues, issues of costs and status of online information, such as overloaded, non-digitised, non-uploaded and hidden. There are tasks that involve transformations from “failure” zones to “success” zones. These are all included in the revised model of “cognitive invisibility”. The study could shed light to information literacy education. Recommendations for further studies have also been suggested.
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1 Introduction

Early in this year 2014, a book named *Going beyond Google again: Strategies for using and teaching the invisible web* has been published (Devine & Egger-Sider, 2014). The idea of cognitive invisible web has been stressed as an even more important concept that supplements and enriches the traditional technical explanation of invisible web. This has triggered my interest to investigate further about the “cognitive” dimension in this field. The interest is then diverted to the model of “cognitive invisibility” in Mansourian’s thesis (2006), where the idea of “cognitive invisibility” has been coined.

1.1 Invisible Web: technical invisibility and cognitive invisibility

Traditionally, "Invisible Web" is defined as "part of the World Wide Web that is omitted from general-purpose search engines" or web directories (Devine & Egger-Sider, 2014, p. 4; Sherman & Price, 2001). Different web-based search tools have different versions of the Invisible Web. Every version of the Invisible Web is created concurrently with development of search engines or web directories (Devine & Egger-Sider, 2014).

This kind of omission of information is due to some objective factors that are independent to web searchers. The factors consist of the ability of crawler (breadth, depth, frequency of crawl), private restrictions set by the websites to avoid crawling, proprietary restrictions set by the websites such as registration requirements, other new types of web contents that are unable to be crawled (Devine & Egger-Sider, 2014; Sherman & Price, 2001). From web searchers’ perspective, the phenomenon that the Invisible Web is already set and independent to their information seeking can be called as "technical invisibility", which has been used in Mansourian’s (2006) study.

In contrast to "technical invisibility", "cognitive invisibility" stresses the "cognitive subjective" aspect of the invisible web (Mansourian, 2006, p. 124), that can refer to, all information overlooked on the web during the information seeking process by web searchers (Devine & Egger-Sider, 2014). The idea of "cognitive invisibility" is coined by Mansourian (2006, p. 119) when the author considers successes and failures in information seeking more generally with the invisible web. The model proposed in Mansourian's studies considers users’ cognitive aspect of web-based information seeking.

1.2 A brief presentation of the model of “cognitive invisibility”

The model categorises six types of searching into four zones in terms of two dimensions. The horizontal dimension of the model is users’ certainty of whether the desired information is on the web and the vertical dimension is whether the desired information is discovered. The four zones are namely bright zone, opaque...
zone, veiled zone and dark zone. Six corresponding types of success/failure in information seeking are also named in the graph as anticipated success, serendipitous success, unexpected success, unexpected failure, unexplained failure and predicted failure. A presentation of each zone and each success & failure type is in 2.2 and 2.3.

Graph 1  Mansourian’s model of "Cognitive Invisibility"

Source: Mansourian (2006)

1.3 The need to test the model of “cognitive invisibility”

Till now, nearly a decade has passed after the model of “cognitive invisibility” and the meaning of search engine and Internet to users has also been transformed. According to the report of Search Engine Use 2012 from Pew Internet (Purcell, Brenner & Rainie, 2012), the percentage of all Americans using search engines has soared from 53% in 2002 to 73% in 2012. In addition, due to the development of search engines and the coverage of internet connections, the relationship between search engines and users must have greatly changed. Data from the same report in 2012 shows that 91% of searchers mostly use search engines as the first tool for information seeking, and 73% of searchers believe that most or all the information they find through search engines is accurate and trustworthy.
Considering these environmental factors, people’s perception of both cognitive invisibility and success & failure of information seeking on the web must have been changed. It is necessary to see how the model of “cognitive invisibility” could address these changes. Although the model has shown some impact on information behaviour studies (Huvila, 2011; Webber, 2013), no research has done to test the model since it has been created.

1.4 Research aims and objectives

1.4.1 Research aims

The aim of the project is to understand how the model of “cognitive invisibility”, mainly proposed by Yazdan Mansourian in his thesis and a set of published journal articles, is manifested in search experiences, especially task situations, described by postgraduate students.

1.4.2 Research objectives

The objectives of the research are listed below.

(1) Identify key research relevant to “cognitive invisibility”, success & failure and task situations in information seeking;
(2) Understand how postgraduate taught students conceptualise their past successful and failed search experiences;
(3) Understand how different zones and success & failure types in the model of “cognitive invisibility” are related to different task situations in searching;
(4) Propose a revised model for “cognitive invisibility”.
2 Literature Review

2.1 Information seeking and information seeking on the web

The idea of information seeking has several key aspects. First, information seeking is closely related to the idea of information needs, as Tom Wilson suggested, information seeking behaviour is "the purposive seeking for information as a consequence of a need to satisfy some goal" (Wilson, 2000, p. 49). Case (2012) has discovered that information seeking is generally taken for granted as the behaviour of people in response of a need for information in most empirical studies. Therefore, it is important to take the special needs of searchers into consideration when their information seeking behaviour is investigated.

Second, compared to the general concept of information behaviour, information seeking tends to focus on the active and intentional behaviour rather than passive or unintentional behaviour. Wilson (2000, p. 49) defines information behaviour as "both active and passive information seeking, and use", whereas information seeking behaviour is more "purposive". Case (2012) also summarises the "purposive" characteristic of information seeking from a number of studies. However, there is a common phenomenon of gaining information in a passive way, that is, serendipity, which is seen as an important component in information seeking (Foster & Ford, 2003).

Third, context is another aspect of information seeking. Johnson (2003) investigated the impact of two different contexts, or situations in information seeking, organizational and cancer-related, and proposed to add context elements in information seeking research. Ingwersen and Järvelin (2008) have suggested the cognitive information concept in information seeking and retrieval, based on integrating all information related behaviour into contexts or environments.

Based on the three key interrelated aspects, the concept of information seeking is cognitively presented. It is, however, sometime more important to know how research form the idea of information seeking in the environment of the web or the Internet.

Mansourian (2006) identifies the three necessary elements of successful information seeking on the web, i.e. existence of information on the web, tools for information seeking and proper use of these tools:

*In general, searching the web is an interactive procedure between end users and web-based search tools to achieve a goal. A successful search only happens when the required information exists on the web, the employed search tool is able to locate it and the user employs the search tool properly... if one or more elements do not work properly users are not able to locate what they are looking for.*
In addition, five main elements affecting the performance of web-based information seeking of end users have also been proposed in an inductive qualitative study (Mansourian, 2008b). These categories can be seen as the extended version of the three elements above. The five elements include, web users' characteristics, type of the employed search tool, search topic, search situation and features of the retrieved information resources (Mansourian, 2008b).

2.2 Success & Failure of Information seeking

2.2.1 Concepts of success & failure in information seeking studies

In Wilson's (1981) research, he identified "failure" as one of the interrelated fields of user studies at that time and stated that "failure" in information seeking may be experienced in both using computer-based systems and communicating with other people. However the idea of failure itself remained unexplained in the study. This may be either due the fact that the concept is too simple and is self-explanatory, or because it is too complex to define such an idea concerned with plenty of factors.

Meho (2003) considers success and failure as a node or a factor that connects the move among stages in a revised model of Ellis. The four stages of information behaviour by scholars are searching, accessing, processing and ending. It is argued that success and failure are related to whether various types of needed information are accessed and gathered. In this study, success or failure in information seeking are used as the only factor that lead searchers to either move on from accessing stage to processing stage or move back to the searching stage, although it seems that other factors have not been considered, such as missing of information and updating of new information. It appears that the idea of success & failure is still not very comprehensive and clear.

A tentative definition of failure in information seeking is given by Shenton (2007) in his clarification of terms for the study of young students information seeking behaviour under 18. Information seeking failure

"was assumed to relate to situations in which a user, having decided to take information seeking action, was unable to access material that contributed, in that person's eyes, to the adequate satisfaction of the need".

So in Shenton's opinion, information seeking failure is a more subjective feeling of satisfaction of needs of individuals.
Huvila's (2011) study of failures in people's interpersonal information seeking within a close group of individuals suggested that failures in finding the right answerer, in asking the right questions are because of a variety of external and internal, contextual and subjective factors. Although the research is not about web-based information seeking, it is possible to suggest that the two settings of information seeking approaches are common to some extent.

A more comprehensive study of failure and success in web-based information seeking is made by Mansourian (2006). Based on interviews of research students and staff, Mansourian demonstrated three ideas of interviewees' conceptualisations of success and failure of web-based information seeking in his thesis. The first is that success and failure is largely related to whether the desired information is found during information seeking processes, no matter how much time and energy are spent in these processes. Secondly, on the contrary, some interviewees believe that the amount of time is the main factor in differentiating success and failure. Failure may be finding a piece of information with more time than an ideal amount of time set by an individual. Thirdly, there seems to be a scale from absolute success to absolute failure where one informant believed his searches were mostly partly successful.

In addition to this, it is also identified a thorough set of 18 dimensions to understand the success and failure of information seeking on the Web in Mansourian’s thesis (2006). These 18 dimensions are basically related to the task situations of searches (severity, time allocation, frequency, etc.), to searchers' perception or analysis of a search process (uncertainty, predictability, feeling, attribution, etc.), and to searchers' strategies in information seeking (adjustability, experimentation).

Mansourian's treatment of the idea of success and failure in information seeking shows the complexity of studying this field. More importantly, Mansourian has taken a more subjective angle to study success and failure in information seeking. The dissertation, aiming at testing Mansourian's model, will continue to see success and failure in web-based information seeking as a more contextual and subjective manner.

2.2.2 Categorisation of successes and failures in Mansourian’s studies

Mansourian (2006) categorised success and failure in information seeking into six types according to searchers' expectation of existence of information on the web, whether the information is discovered, and other descriptions of the searching task by interviewees. He attempted to use one adjective to express the characteristic of that success or failure in information seeking. This ensures the conciseness of words in the model, while may be at the cost of precision and comprehensiveness.

The identification of success and failure is "based on the data when users retrieve their required information they consider it as success" (p. 152), despite the fact that having discovered a desired piece of information is
not the exclusive factor to differentiate success and failure. However, further explanations are made in another part of Mansourians thesis (2006, p. 142) when he discussed whether retrieving no information can be a success in searchers' mind in some occasions,

"...this is not “retrieval of information” that determines users’ conception of success/failure in search. This is “discovery of information” which enables the user to discover something to enhance his/her knowledge and then feel successful."

Three types of successes and three types of failures were identified, namely, anticipated success, serendipitous success, unexpected success, unexpected failure, unexplained failure and inevitable/predicted failure (in Mansourian (2008a), it is revised as predicted failure), as shown in the model below in italic.

*Anticipated success* is related to the "bright zone", where users feel confident that the required information exists on the Internet and should be available, and as a result, they arrive to discover that information. This is why it is called "anticipated". It is discovered that the confidence of existence of information on the web is related to users' previous experiences.

*Serendipitous success* categorises the phenomenon that people achieve their search goals when they are not sure whether the required information is available or not.

*Unexpected success* is a more extreme version of serendipitous success. Searchers are quite sure that the required information is not indexed by search tools, and they finally found the information. This sounds unlikely to happen, but it is really identified through some interviews in Mansourian's study. Both serendipitous and unexpected successes are associated to "opaque zone" where searches are likely to bypass search engines to interpersonal information seeking.

*Unexpected failure* reflects the phenomenon that users do not manage to find the information that they think existed on the web. Searcher does not expect his/her search fails but it actually happens. In this case, information is missed and this type of failure is related to the "veiled zone". People who experienced an unexpected failure often have their own explanation of why it happens. They may attribute it to their own search strategy, including using inappropriate search queries, inappropriate search tools, or they attribute it to the situation that the required information is "hidden" and therefore not easy to figure out the right search terms.
*Unexplained failure* is used in the model when a user was not certain whether the information s/he has been searching for was available on the web or not, and s/he failed to discover that information. In this case, searcher may be unable to explain his failure, since he cannot be sure whether this is due to the unavailability of information on the web, or due to his inappropriate search processes.

*Inevitable/Predicted failure* is used to categorise the situation when a user certainly believes that the information s/he has been looking for information is not available on the web and as predicted this information is cannot be found. This thought of certainty of inexistence of the required information on the web may be held before or after the search has been carried out. This type of failure is called *predicted failure* in a latter paper by Masourian (2008). Both the unexplained failure and inevitable/predicted failure are belong to the "dark zone" where information is either unknown or unavailable.

The six types of success or failure present an image of combinations of some key factors in cognitive subject aspects of web-based information seeking. However, it is generated using data at least 8 years ago and therefore it is important to see how the image has evolved during about a decade.

### 2.3 Zones and their related task situations in the model of "cognitive invisibility"

It is shown in the 2.2 that the six types of success or failure are related to the four zones, namely, bright zone, opaque zone, veiled zone and dark zone. It is clear that each zone is determined according to two dimensions, level of uncertainty of whether information is indexed and whether the information is discovered. It is important to know what kind of task situation is related to each zone in the original study by Mansourian (2006).

**Bright Zone** (marked as A1 in the model) is associated to "the most straightforward kind of search on the web" (Mansourian, 2006, p. 124) which is likely to have the least difficulty to discover desired information. The searchers use search engines to find information smoothly without problems, one example in the original study is about successful using Google to find images of plants and there were no problems during the searching process. Sometimes, the whole search session may consist of few more stages, such as modifying queries or changing search tools, but generally it goes smoothly. In this case, the search can also be included in the bright zone. In bright zone, there are searches tasks both for academic use and for everyday life.

**Opaque Zone** is related to information seeking tasks carried out by means that are not through web searching. That means people successfully discovered the desired information without using the web. In this case, there are two situations. In the first situation (marked as A2 in the model), people are not sure whether the information is indexed or not, so they may use the search tools to ascertain this, or they may use an approach
other than web searching, for instance, asking colleagues. The first situation is linked to "serendipitous success".

The second situation (marked as A3 in the model) is that, since people are sure or feel that the desired information is not on the web, they try to confirm this belief by carrying out some web searching tasks, and both having managed or not managed to find related information can happen in this case. This is interesting because in this situation, failing to retrieve a piece of information is seen as a success of discovering some knowledge of whether the information is not on the web. This happens when people "hope to retrieve nothing", or when they try to seek proof that no information exist in a certain topic (Mansourian, 2006, p. 128). In the model, this situation is linked with "unexpected failure", but according to the idea of "unexpected failure" summarised in 2.2, there seems to be inconsistence between the zone A3 and the word "unexpected". Better suggestions for A3 may be "predicted" or "confirmed" success.

Veiled Zone (marked as B1 in the model) is related to the situation that user failed to discover information on the Internet when s/he expects that information should be available online. The information is felt to be indexed on the web, but due to a set of factors mentioned from different interviewees, such as lack of time, impatience to do further searches, inappropriate keywords and strategies, requiring fee-based subscription and lack of specific search tools, actually it is not found by searchers. Searches in the veiled zone could have been turned to searches in the bright zone if some of these difficulties of searches can be fixed during the searching processes. Veiled zone is linked to "unexpected failure" as shown in 2.2.

Dark Zone is divided into two parts, the first one (marked as B2 in the model) is that the searcher are simply not sure whether the information is available on the web and s/he fails to discover it; the second part is that the searcher feels that the information is probably not stored on the Internet and this feeling may be drawn after the user has finished searching. The first part is related to "unexplained failure" and the second part is related to "inevitable/predicted failure".

2.4 Research related to the model of cognitive invisibility

There are some studies having referenced the Mansourian’s studies of “cognitive invisibility”. The most recent one is the book Going beyond Google again: Strategies for using and teaching the invisible web, which borrowed the idea of “cognitive invisibility” to stress the cognitive aspect of invisible web. However it is only a reference of the idea, rather than the model of “cognitive invisibility”.
Sheila Webber (2013) has applied the Mansourian’s model and the Ellis’s model in her study of information behaviour in Second Life. The study demonstrated that it is meaningful to use the model of “cognitive invisibility” to understand the “blended information behaviour” (p. 85) derived from this new technology.

A more detailed application of Mansourian’s model is made by Huvila (2011). Interestingly, the research is about failure of interpersonal information seeking rather than information seeking a web-based setting. The two dimensions of the model, both vertical and horizontal are considered to categorise some failure search situations into the three "failure" zones (unexpected failure, unexplained failure, predicted failure). For example, as stated in Huvila's study.

"With most utterances it is conceivable that the asker did not expect that the question would not be answered (unexpected failure). Searchers seemed to have been anticipating that their questions could not be answered (predicted failure) only when parents were deliberately asked impossible questions about computer games or similar topics outside their known sphere of knowledge."

This shows that Mansourian's model can be potentially used in non-web-based information seeking studies, even though this way of usage may not have been discussed in the original research. From Huvila's (2011) research, it seems suitable to borrow this model, however, no words were concerning to the validity of using a model of web-based information seeking to a model of face-to-face information seeking.

2.5 Task Situations and their impact on information seeking

The idea of tasks has been elaborated in detail in information studies. It can be briefly defined as an activity or a set of actions to be performed in pursuit of a "goal" (Byström & Hansen, 2005; Vakkari, 2003). To have an in-depth understanding of the concept, it is essential to categorise different kinds of tasks. A clear categorisation is to divide tasks into work tasks and search tasks (Ingwersen & Järvelin, 2005). Work task is a general term referring to task from jobs, daily-life or anywhere else to fulfill some interests of actors. Work tasks can transform to search task situations when it is required. Search tasks, are activities to obtain relevant information to complete the work tasks (Ingwersen & Järvelin, 2005). A search task may include generation of information need, information interaction and search task solving (Ingwersen & Järvelin, 2005). In the study in this dissertation, search tasks will be considered in detail.

Some studies consider solely search tasks within web-based information seeking, breaking them down to information gathering, browsing and transactions tasks (Kellar, Watters & Shepherd, 2007), or dividing them according to the time and effort available in the process, ex. information lookup and exploratory search
(Marchionini, 2006). These studies can shed light to research that needs to analyse different types of search tasks in detail.

Another understanding of tasks to supplement is made by Byström & Hansen (2005) considering information seeking as a subtask of work tasks and considering information searching as a subtask of information seeking. According to this hierarchical framework, it is reasonable to study the information seeking and searching in a broader context of task situations.

A more comprehensive approach, faceted classification of tasks in information searching is purposed by Li & Belkin (2008). The faceted classification is structured on generic facets, common attributes and sub-facets. Generic facets of task comprise of "Source of task, Task doer, Time, Action, Product, and Goal" (Li & Belkin, 2008, p. 1822). Common attributes of task include two parts, "Task characteristics and User’s perception of task" (Li & Belkin, 2008, p. 1822). This framework can be used to categorise tasks in real life situations for research purposes.

Research has attaching some importance to work tasks in information behaviour studies, although little attention has been paid to analysing specific work tasks in information searching (Ingwersen & Järvelin, 2005; Vakkari, 2003). Vakkari (2001) carried out an empirical and longitudinal study in the context of academic education to integrate task-based factors into Kuhlthau's model in the field of Information Retrieval. It is concluded that the mental model triggered by task situations is closely related to searchers' information sought, search tactics and information assessment (Vakkari, 2001). The factor of tasks is therefore a very important element to be tested in the study.

2.6 Some other models of Information Seeking Behaviour for this study
There are also some important models of Information Seeking Behaviour, other than Mansourian's model, to shed light to this study. One classic model to present is the Ellis model (Ellis, Cox, & Hall, 1993; Ellis & Haugen, 1997), generated using grounded theory with studies of scientists in both social science and science department. The model featured six types of activities and two added actions, namely, starting, chaining, browsing, differentiating, monitoring, extracting, verifying and ending. Although these activities are not supposed to be considered as a fixed order for academic information seeking, they are useful to identify the action type of tasks described by interviewees in the study of this dissertation.

A more recent revised model of Ellis is made by Meho & Tibbo (2003). In their research, data were gathered using e-mail interviews and the e-mails are selected from authors in four bibliographic databases, Arts & Humanities Citation Index, Geobase, Social Sciences Citation Index, and Sociological Abstracts. E-mails
were sent to 212 authors in 14 nations and 60 valid responses were received. To supplement written data, face-to-face interviews with five scholars were also carried out.

A new model has therefore been generated based on the Ellis model, grouping all features into four stages, searching, accessing, processing and ending. In addition, four additional features have been added to the revised model, namely, accessing, networking, verifying, and information managing. Comparing this to Ellis model, it appears that the revised model has presented a fuller picture of Information Seeking Behaviour for academic purposes.

The Meho & Tibbo model (2003) is more important for this study. This is firstly because the research is more recent and is at the time when web searching has been popular in academia, so that a fuller and realer image can be witnessed in this model. Secondly, the study is based on authoritative social scientists, more related to the educational school students that will be investigated in the study of this dissertation.
3 Methodology

3.1 Research Design

Since the aim of the study is to test Mansourian’s method, the study therefore falls within the bounds of deductive research and data will be collected through a qualitative approach, semi-structured interviews. The design of the research procedure tends to imitate the way how interview data was treated in Mansourian’s thesis (2006) and to make it in a much smaller scale.

3.1.1 Target group and subjects

It is important to stress how the department of the subjects is chosen in this study. Five postgraduate taught students who have studies one year in School of Education will be interviewed. The reason why students in School of Education are interested is because in Mansourian’s study, the target group was a biology community in University of Sheffield and this research is aiming to test the model in a social science department. The shift of target group from a science department to a social science department has shed light from the idea how the Ellis’s model had been tested. The Ellis’s model was firstly generated from a social science department, then being tested in physics and engineering departments (Ellis, Cox, & Hall, 1993; Ellis & Haugen, 1997).

Four of the five participants are female and from Chinese, and the other one is a male from Korean. They are all current students who are doing dissertation in School of Education in University of Sheffield. Among them, three have had some working experiences for years. A clear description of their use and general feeling of the Internet, as well as information education they received during the master course, is presented in the session 4.1.

3.1.2 Design and change of interview questions

The research questions are designed based on the list of twenty interview questions in Mansourian’s (2006) thesis, in Appendix 6 of his original research. A pilot study is conducted based on these initial interview questions (presented in Appendix A in this dissertation) to see how these interview questions work, and what further information, especially related to the task situations, can be added. The interview questions were reviewed to a great extent after the pilot study.

Apart from borrowing the interview framework in Mansourian’s study, some other research related to the task situations of information seeking behaviour are also applied to the design of the interview questions. The first framework is the faceted classification of tasks, created by Li & Belkin (2008) based on a thorough review of existing studies of task situation in information seeking. This model is very useful since it has covered nearly
all dimensions that can describe an information seeking task. The other three models applied are the Ellis’s model, the revised model of Ellis’s by Moha & Tibbo (2003) and Marchonini’s (2006) classification of search tasks. The list of interview questions designed for the main study is presented in the Appendix B.

3.1.3 Other issues of the interviews in this study
All five interviews are done in group rooms in Information Commons, the main library of University of Sheffield. Two facilities, iPhone 5 and an audio/video recorder, are used to record the interview audio. Only the audios of interview are recorded.

One essential process during interview is that, to present the model of “cognitive invisibility” to the interviewees, and let them categorise their tasks into the zones. The reason to design the research in this way is that, firstly, people themselves are the ones who know the best what their own search tasks are about, it is more credible to let them to decide what zone is the most related to each of their search. Secondly, this procedure can test how users interact with the model of “cognitive invisibility”. The findings of this testing can shed light to revision of the model.

Chinese is used to talk with Chinese interviewees, since it is easier for both of the interviewer and the interviewee to communicate. If interviewees’ native language is not Chinese, then English will be the choice. Normally, an interview using Chinese took around 30 minutes; however, one interview in English with a participant from Korean took about 70 minutes. All interview data need to be transcribed for analysis.

3.2 Ethical Considerations
The study needs to be approved ethically since it involves interviews with postgraduate students in the University. Consent forms are given to all interviewees before the data collection. Data of interviewees are be collected anonymously. Data collected from semi-structured interview are kept confidentially during the research period and be destroyed after the study. In addition, the places to conduct the interviews are in group rooms of the library of the University. These are ideal places to confirm that during interviews, no voice information can be heard by others. The information sheet, or consent form is displayed in the Appendix E.

3.3 Data Analysis
The approach of thematic analysis is adopted in the study. The study follows two views of steps of thematic analysis proposed by Ritche & Spencer (2003) and Braun & Clarke (2006). Ritche & Spencer (2003) suggested a top down way to code deductively, whereas Braun & Clarke (2006) maintained a bottom up approach to deal with emergent codes. The deductive study firstly, builds a set of a priori codes from some key literature, then use these codes to describe the search tasks while enriching the code framework with some
inductive codes. Based on literature in the session 2.4, an initial scheme of coding is generated before analyzing the interview data. The table of a priori codes is shown below.

<table>
<thead>
<tr>
<th>Literature</th>
<th>A Priori Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kellar, Watters &amp; Shepherd, 2007</td>
<td>Fact Finding</td>
<td>looking for specific facts or pieces of information</td>
</tr>
<tr>
<td></td>
<td>Information Gathering</td>
<td>collection of information from multiple resources</td>
</tr>
<tr>
<td></td>
<td>Just Browsing</td>
<td>a serendipitous task, visiting Web pages for entertainment or to see updated information</td>
</tr>
<tr>
<td></td>
<td>Transactions</td>
<td>performing an online action, such as login or e-mail checking</td>
</tr>
<tr>
<td>Marchionini, 2006</td>
<td>Information lookup</td>
<td>returns facts, known items or other well-structured and discrete information</td>
</tr>
<tr>
<td></td>
<td>Exploratory search</td>
<td>including a set of querying and browsing actions and other action such as evaluation, comparison, synthesis, for the purpose of learning or investigation.</td>
</tr>
<tr>
<td>Ellis, Cox, &amp; Hall, 1993; Ellis &amp; Haugen, 1997</td>
<td>starting</td>
<td>activities characteristic of the initial search for information;</td>
</tr>
<tr>
<td></td>
<td>chaining</td>
<td>following chains of citations or other forms of referential connection between material</td>
</tr>
<tr>
<td></td>
<td>browsing</td>
<td>semi-directed searching in an area of potential interest</td>
</tr>
<tr>
<td></td>
<td>differentiating</td>
<td>using differences between sources as filters on the nature and quality of the material examined</td>
</tr>
<tr>
<td></td>
<td>monitoring</td>
<td>maintaining awareness of developments in a field through the monitoring of particular sources</td>
</tr>
<tr>
<td></td>
<td>extracting</td>
<td>systematically working through a particular source to locate material of interest</td>
</tr>
<tr>
<td>Meho &amp; Tibbo, 2003</td>
<td>accessing</td>
<td>get access to, or get hold of the information</td>
</tr>
<tr>
<td></td>
<td>networking</td>
<td>activities associated with communicating and exchanging information with other people</td>
</tr>
<tr>
<td></td>
<td>verifying</td>
<td>checking the accuracy of information found</td>
</tr>
<tr>
<td></td>
<td>information managing</td>
<td>filing, archiving, and organizing the information that have been collected or used during a research project</td>
</tr>
<tr>
<td>Li &amp; Belkin, 2008</td>
<td>User’s perception of knowledge of task topic</td>
<td>High knowledge/ moderate/ low knowledge</td>
</tr>
<tr>
<td></td>
<td>User’s perception of complexity of a task</td>
<td>high complexity/ moderate/ low complexity</td>
</tr>
<tr>
<td></td>
<td>Frequency of conducting a task and similar tasks</td>
<td>unique/intermittent/routine</td>
</tr>
<tr>
<td></td>
<td>Time length of conducting a task</td>
<td>short-term/long-term</td>
</tr>
</tbody>
</table>

3.5 Limitations
Two limitations could be anticipated according to the methodology applied. The main issue of this research is that, the number of interviewees seems to be slightly less. The study tends to categorised the search
experiences into zones, can describe tasks using code frameworks, it could be argued that the more interviewees, the more accurate research findings.

Another possible limitation could be bias of culture, since all participants are from Asian countries, there seems to be a difference interpretation between Asian and European in interpreting the idea of success and failure, this might partly be related to some linguistic factors.
4 Findings

4.1 General Information of Interviewees’ web searching behaviour
As stated in the methodology Chapter, five current Master students in Education School of University of Sheffield have been interviewed. Among them, three have some work experiences.

4.1.1 Participants’ search experience and frequency
Since there is relationship between search experience and search success. It is important to investigate interviewees’ search experience, that is firstly to know how long they have been searching on the web and how often they search on the Internet every day.

In terms of how long interviewees have been searching the web, it is discovered that for all of the five interviewees, they have been searching on the web for more than ten years. Since the idea of information seeking on the web is broad in this study, including both searching for academic use and searching as a task in everyday life, such as entertainment search, there seems to be no clear difference between “searching on the web” and “use the web”. A participant noticed this similarity.

_I: Then when is the first time that you searched information on the web?_
_P2: You mean the function of the Internet is not for entertainment but for information seeking, is it?_
_I: Entertainment search is also a part of information searching._
_P2: Or you mean that when did I start using the web?_
_I: Yes, you can consider it like this._
_P2: I started it quite early, basically when the internet has just become popular in China. So it was basically around 1998 or 1999._

Other participants also show that they have long been using or searching the Internet, at least a decade, despite their age differences.

In terms of search frequency, as expected, all participants search the web almost every day and some of them use it for several hours or whenever they have time. It is worth noting that some participants mentioned more or less searching for academic use or for entertainment.

_P4: Usually every day. Like me, whenever if I have spare time, I use the Internet. Out of learning time, or during learning._
If it is for academic purposes, I don’t search every day, but for entertainment, I currently have this kind of activities every day to locate some shows on a fixed website, since the taught modules are all finished now.

So it could be concluded that all interviewees have long time experience and high frequencies of seeking information on the web, although this may varies in terms of the purposes of information seeking.

4.1.2 General feelings of Information seeking on the Web

It is showed that participants can have very different feelings and inclinations of information seeking on the web. 60% of the participants have a more positive inclination to searching on the web, and 40% have more negative feelings.

Those who have a general positive attitude towards searching information on the web, tend to compare web-based information seeking to traditional ways of information seeking, such as finding books in a library. It is likely to get more comprehensive and up-to-date information through web searching in much less amount of time. It is also argued that there are issues around the credibility of online information and information overload, which makes it hard for searchers to evaluate and choose the real and appropriate pieces. However, one participant manifested her interest in reading fake information for entertainment.

I think it is very convenient. In addition, compared to traditional ways [of information seeking], I sometimes can get more comprehensive and updated information. But, maybe it is not good when it comes to the credibility and it is sometimes very interesting, I think, to see some fake information.

I think, in terms of searching for academic use, it is much more convenient to search on the web. Because, for example, if you enter some keywords, you can quickly get much information, but if you are in a library, you may fail to find what you want after a whole day or even a whole week. But, since there is too much information [on the Internet], you sometimes feel very hard to choose [the needed]. In terms of searching for everyday life, in my opinion, since everyone could upload and edit [on the web], the credibility of information is not good in searching. Information you searched may not be real, true or appropriate.

One interviewee manifested a neutral or slightly positive feeling of finding information through a popular searching engine on the Internet. She pointed out that information overload can be an important issue in web searching.
P2: I normally use Google and I think it is ok. No feelings of failing to find information, but sometimes too much.

Two participants (40%) generally have negative feelings of searching on the web. One attributes it to internal reasons, such as information skills, self-confidence in web searching; the other participant stresses that too much information online causes web searching to be a time-consuming task.

P6: I am not good at doing something on the web. I feel confused or not confident when I need to search something on the Internet.

P3: There is very much information on the web, so it sometimes took me lots of time to filter them, this is fairly time-consuming.

4.1.3 Information literacy education about web-based information seeking
Some interviewees were asked whether they have received some classes or lectures about searching academic papers during the postgraduate taught degree in University of Sheffield. Since they all come from the same department, School of Education, there answers are similar.

Interviewees have received only one or two lectures of academic information seeking on the web, in total around 2 hours. The lectures are very practical and focus on basic operations of the library OPAC, StarPlus, and other academic databases. However, to author’s surprise, one participant said she believes that the current lecture is enough for her practice.

P3: The lecture was taught by a tutor from the library. We were in a multimedia classroom with everyone a computer. The tutor presented the steps of how to use databases from our library website.
I: How many lectures there were?
P3: Only one, at the beginning of the master course.
I: Did tutors in your own department mention some related things on modules?
P3: They did, but not related to searching StarPlus, but to using tools in Microsoft Word for citation.
I: Do you think this is enough for you, or do you colleagues find it enough for the study?
P3: I think it is enough and the rest it to practice when I come back, to see how to use StarPlus and other databases.

4.2 Interviewees’ interpretation of success and failure of web-based searching
Interviewees were asked to conceptualise success and failure in information seeking on the web, that is, to answer a question "How do you discriminate success and failure in information seeking on the web?"

Generally participants tend to see whether or not having discovered the desired information as a basic factor to discriminate success and failure in information seeking, as stated by one interviewee.

**P2:** Failure is fail to discover [the desired information]. Success is having discovered it. Is it?

One participant has a higher requirement of success in information seeking. Only having discovered "very useful" information can be categorised in success. When it comes to failure, he stressed the feelings of disappointment when he failed to find some information. From his perspective, failure is more related to a subjective feeling.

**P6:** My answer of [the idea of success information seeking] is that [you have found] very useful information. Sometimes when I can’t find information I want on the web, I was disappointed and I was sorry about myself, that’s all, that’s what I call failure.

P3 is inclined to categorise more searches as success rather than failure by one participant. The informant does not consider spending a long time on searching academic information as a more critical factor to discriminate success and failure. In her view, the most basic element of success is still to find desired information, no matter how much time is used. Partly this is because she sees every information seeking process as a way to progress and believes this can help her develop searching skills and reduce time in searching. However, interestingly, when asked to describe a failure experience in web searching, the informant could not give any examples, and this could be interpreted as an avoidance of admitting failure.

**P3:** I sometimes use 3 to 4 hours to locate articles in a topic, but I think this is success rather than a failure, because I finally got what I want. People around me also think searching academic articles is a fairly time-consuming process, so this is common among students. But for experienced researchers, searching academic papers may be a thing much easier. This may be due to their proficiency of web searching and their knowledge. When you practice more, you naturally know what the quicker way to search is, you will develop your own approaches. I don’t dare to say that I have developed my own ways to search, but compared to the time when I had just started my Master, from my first essay, I think I do have made some progress.

**I:** Could you give me an experience that you consider as a failure in information seeking on the web?
P3: I think I cannot figure out such an experience at least at the moment.

The idea of not seeing time use as the key factor to discriminate success and failure of web searching is also manifested by another participant. He said an experience of searching old songs for entertainment, although it took slightly long time, but since the songs are discovered, then it was a success rather than failure. It could be observed a trade-off between time use and search outcome in determine whether a search has been successful or not.

P6:...old song in maybe 70s or 80s. Sometimes I need to [listen them], it takes me a lot time to find them. It is not like searching academic paper, it is just for entertainment.

I: Do you think this old song experience was a failure of finding information?

P5: No, no, no, I don't think it is a failure, it just takes a little bit longer time than I expected, I can find it, yeah old song.

Very different from the previous participant (P3), it is confirmed by another participant that failures in finding literature can be temporary.

I: You have mentioned an experience that you couldn’t find some literature but finally you found it, do you think this is failure?

P4: Maybe, it may be a kind of temporary failure. But there are times you really cannot find the information you want, you could only ask your tutor.

Unlike all the other participants, one informant believes that there should not be discrimination between success and failure. Maybe to her mind, failure is too severe a thing that can never happen in just finding some materials on the web. Feeling of annoyance because of not achieving to find information on the web is therefore not considered as failure in her view.

P5: Basically I don’t think there is failure and success [in web searching]. I have never thought about this issue. For example, if I need to search then I use some approaches.

I: But you must have your own comments to your search outcomes every time, right?

P5: Not really, I may just feel annoyed if I can’t find the materials I need. But, I don’t think this should be called as “failure”.

Summarising the interpretation of success and failure in web-based information seeking above, it could be argued that people may have very subtle attitudes toward the discriminations of success and failure. There
seems to be a trade-off between time use and search outcome to decide whether a search has been successful or not, although two of the five participants have shown an inclination towards searching outcome rather than time use.

Nevertheless, the categorisation of a search to success or failure seems to be subjective and even individual. To know more about how interviewees differentiate success and failure in web-based information seeking, it is necessary to know how they describe a success or a failure search, i.e., the situation of search tasks.

4.3 Matching of search tasks and zones with success & failure types

In this session, different search tasks described by the five interviewees will be matched with two parts of the model of cognitive invisibility that are zones and success & failure types.

4.3.1 Bright Zone – Anticipated Success

This zone is the only one that can cover the at least one search from each participant. These search experiences include information seeking for both academic and other purposes in everyday life.

As mentioned in Mansourian’s study, academic searches in this zone are very straightforward and normally conducted without problems. A typical situation corresponding to this is described by P6, who used references as a source to locate papers and generate query words for academic web searching. In this case, the certainty of whether the paper is on the web is related to the chaining process, an activity extracted from Ellis’s model.

_P6: Sometime I can find them, [because] they are connected to each other, for example, this paper has also you know, on the back there are lots of reference, and one of them I can find another one here. Sometimes when I read in books and other research papers, I can find proper word, relevant word, so just I typing that word, and I can collect another paper. So the papers I collect then and now, and help me find another one._ (P6.1a)

Another straightforward experience is about finding evidence for an argument during dissertation writing, described by the same participant. Similarly as the previous one, a process of typing query words into a search engine to get useful papers is mentioned. It is also manifested unconsciousness of believe before conducting a search in this case.

_P6: I wanted to find useful English sentences for my dissertation. The main reason is that I want to support my argument, positively or negatively. So, I typed some key words on Google, and successfully
got what I need. Thanks to the search engine......Unconsciously I believe there are related papers on the web, so I had tried to do it. (P6.2a)

Participant 2 has mentioned a quick fact search which was conducted at the time she was watching a history lecture online for her own interest. This is a very typical search in anticipated success. Past experiences for years have given her the confidence that she could be able to locate, absorb the information and compare the information to her own knowledge in only a few minutes through search engine. It is interesting that her believe of whether information is available online is strengthened by the fact that she is now in a foreign Country outside of mainland China, where there are still some restriction of sensitive contents.

P2: One experience that I remember clearly was last time when I was watching Tengfei Yuan’s history lecture on Youtube. He mentioned the event that the former Soviet Union and German partitioned Poland. There was a forest in Belarus, where 15,000 Polish was killed by the former Soviet Union. I was interested how this fierce hatred had come up from Soviet Union against Poland, so I stopped the video and searched the history of this hatred and the name of the forest. All information had come up. I found that their hatred was similar to the relationship between China and Japan. I was surprised [by the history] and I then know what the main contradictory was at that time. I think this search helped me quickly get access to some information and I didn’t really want to do some research or know it deeply. This was only for my curiosity and the whole searching and reading process only took me 5 to 10 minutes.

I: Did you believe that information is on the web before you searched it?

P2: I didn’t thought about it, but I think it is unlikely that you fail to find it, since I have used this kind of way for many years and now in a foreign Country, [a country outside of mainland China], basically all information could be found and, the information that I was seeking is not sensitive. (P2.1a)

Searches in everyday life to react to personal changes, categorized in this zone, can be very long tasks which may be conducted for several months. An informant (P4) has elaborated her experience of web searching before coming aboard to the University to gather information to prepare for new life in England. She mentioned that differentiation and evaluation of information is important in this kind of search and normally takes very long time. It is also worth noting that the relationship between the participant and search engine is intimate. Searching on the web is not a complex thing for her, but a thing that she finds interesting and can give her positive feelings when she successfully find some information.

P4: There are many successful experiences of finding information on the web. When I was before coming to the UK, I had found some information, for example, what are the things I need to put into baggage, and
what cultural differences I need to care about, and what life problems I may encounter here in the UK, or in another way, what preparations I need to do psychologically. I think people can search and get much information on the Internet.

I: How much time you had searched on the Internet for the preparations of coming here?

P4: I was searching information when I have time during the whole summer vacation, because so much information around this is online. Sometimes, people’s opinions may not be the same. For example, some people suggested you to buy a rice cooker, but some others not, considering that it is too big and can be bought in the UK. So, finally it is up to you, you need to judge the information. This can take lots of time.

I: Do you think it is a complex thing?

P4: I don’t think so. I find it interesting, because I think it is convenient and I like using search tools such as Baidu and Google. I like them both ... When I found useful information, I feel excited, very glad. A kind of relieve, very glad. I now know more information again. (P4.1a)

A similar task situation is described by participant 3. She spent three months to gather information online to decide what and where to study in Master and finally applied to Education School of University of Sheffield. The information gathering is related to five stages, seeking major, seeking university, inquiring by e-mail, providing materials and application. The ways of gathering information were various, including searching, browsing and networking (sending e-mails). This sounds complicated, but she doesn’t feel that it is a difficult thing. It is not surprising to see that she had felt that information should be on the web before she started all information seeking process, although sending e-mail is a special information gathering task in this case (P3.1a).

4.3.2 Veiled Zone – Unexpected Failure

Only 3 out 5 participants have told search experiences in the veiled zone. All search tasks in this zone were for academic purposes. The issues around accessing and cognitive invisibility were manifested in the interviews.

Accessing problems are important factors that can lead to unexpected failure. One type of accessing issue is payment and subscription requirement. Participant 6, who believes that articles found from chaining should be available on the web, but since it needs payment subscription, considering the cost of money and time, he finally did not managed to get access to the important papers. To some extent, the issue of accessing is a manner of cost.

P6: I read a paper, and then each paper has lot of reference and then so they are very useful. You know papers seem very important for my dissertation. So I want to read them, so I type in the title of the papers on Google, some of them I cannot find it or some of them even though I have found them on Google I have
to pay. So you know, then I cannot read them on paper, because I don't want to pay, because very expensive, because quite difficult you know, the things I have to pay anyway it takes a lot of time, I don't want it, so yeah. (P6.1v)

Another type of accessing problem is mentioned by participant 4. Since the electronic version of a book is not available and the hard copy is only stored in a public library rather than in one of the university libraries. Considering the cost of distance, the participants chose to not borrow the book. There also seems to be a link between access and cost in this case.

P4: Recently, my supervisor has recommended me a book about childhood, but I failed to find it both in the university library and on the web, through searching Google. Neither electronic nor hard copy was found. But, at last I searched it in one local library in Sheffield, there is one there. But since it is too far from my home, I finally didn’t borrow that book. (P4.1v)

There is also a search experience about gathering information around a topic for dissertation. This case should be categorized in the veiled zone, because the topic the participant had tried to search is a common phenomenon in life, she believes that information around such a topic or a research field should exist on the web. However, maybe because that she had used inappropriate query words to search, or the papers were hidden because of they discuss the topic in an unexpected way, she did not manage to find the desired papers on the Internet. Although this seems to be a very typical instance of cognitive invisibility, the participant reckoned it as a more objective manner.

P4: I wanted to find some literature around people’s worries about new technologies, for example, television, when it was invented, people concerned whether this could do harm to themselves, to cause low eyesight, because of radiation. But I failed to find literature around this topic on the web, although there were many articles on webpages, but no academic papers were found. I still believe there are papers around this topic, since it is a quite common phenomenon, especially in China. Maybe this is due to my wrong key words, or literature may be hidden deeply, for example, the title of literature or its key words may be some words other than my query. Maybe the topic of my query is only mentioned as one aspect in literature. So it was hard for me to find that paper through search engines.

I: Do you think the second reason is more objective or more subjective?
P4: I think it may be an objective reason, the second one. (P4.2v)

4.3.3 Dark Zone – Unexplained Failure and Inevitable/Predicted Failure
Sometimes failures to access may be attributed to the fact that the paper is too old to have been digitised, as assumed by participant 6. Before searching, he was quite certain that paper should have been stored online, but he finally considered that this paper may not exist on the web. So this could be seen as a typical inevitable failure.

\[ P6: \text{A couple of days, I am confident, I am sure I can find it because it is about research paper in Sweden, I am sure I can find it, it was commented in reference of another paper. But I can't find it, I don't know why, maybe it was published in 1980s, it's a quite old research paper. So that's why I cannot find it.} \]
\[(P6.2d)\]

Participant 4 has assumed one situation that could happen as a failure in the dark zone, but it was just her assumption, not a real search. She suggested that some creative ideas occurred from inventers and scientists, which had never been discussed in literature, may receive no search outcomes online. Similar situation has been elaborated in Mansourian’s (2006) thesis when he explained the dark zone.

4.3.4 Opaque Zone – Serendipitous Success and Unexpected Success

In terms of the serendipitous success in the opaque zone, there is only one participant (P5) who mentioned the serendipitous success, but she did not describe the search tasks of this success. Another participant (P4) said that she cannot remember an experience that she discovered desired information when she felt uncertain whether that information was on the web.

No tasks related to the unexpected success were appeared in the interviews. It is therefore evident that searches in the opaque zone are much fewer than searches in other zones for the five Master students in School of Education.

4.3.5 Transformation from “failure” zones to “success” zones

Interestingly, two interviewees have expressed search experiences that include temporary failures. The move from temporary failures to final successes could be seen as a transformation from “failure” zones to “success” zones, according to the model. This kind of transformation has not been discussed in the formal study of the model of “cognitive invisibility”.

The first type transformation is from the veiled zone to the bright zone. The participant 4 elaborated that failure can be temporary and rephrasing search strategies could lead to a success in the end. This is different from a pure bright zone search, since the interviewee has clearly stated that there were temporary failures.
P4: When it comes to failures, sometimes apart from the situation that I really couldn’t find information, the situation that information is not there, there seems also to be some temporary failures. As what I said previously, it is a matter of not using the right approaches, or it is because that you’ve omit it unconsciously. But maybe at last, when you improve your approaches, [the desired information] could be found.

The second type of transformation is from the dark zone to the bright zone. The participant (P2), at first, failed to find some papers in a topic, since she did not know what the appropriate query words were or the payment and subscription were required to download full texts. One time, when she was communicating with one of her colleagues who had a similar dissertation topic, the colleague told the participant that she found lots of relevant papers and gave her one title of a relevant paper. This worked as an intervening variable that made participant 2 believe that information should exist on the web, and very much serendipitously, she finally found what she needed by arbitrarily reformulating the query to be more general.

P2: At the very first time, I thought that I really couldn’t find anything. I searched the word “identity” “higher education” “motivation identity”, but the things that came out were not relevant my topic. Sometimes, I could identify some relevant papers through references of a key paper, but when I searched the titles of those papers, many of them required payment, that made me even more annoyed. But yesterday, when I was searching with some key words for an argument support for writing a proposal, I searched arbitrarily with “Chinese” “Chinese student” “in UK” and I even didn’t put the word “identity”, and a bunch of papers that what I need came out.

P2: The reason why I did that search was also because I was previously interviewed by a friend whose topic was very similar to mine. She was doing research about motivation and stress, and mine was motivation and identity. She discussed with me some ideas suggested by one paper and I was quite curious how she found it. Then she gave me the title of that paper, and told me that there were lots of relevant papers online. It was because of this that I tried to search again and to my surprise, I managed to find many papers. They may not be directly about “conflicts”, but the case study and the models presented in the papers are very useful to enrich the ideas in my dissertation.

The implication of the two kinds of transformations from “failure” zones to “success” zones, and how this could form a revised model will be discussed in the next chapter.

4.3.6 Participants’ interactions with the model
During the interview, the model of “cognitive invisibility” was presented to all interviewees for them to categorise their searches. It is shown that, participants can understand more or less the model so that they can put their own searches according to the horizontal, vertical dimensions and the name of each zone with success & failure types. It is also manifested from P2 that she tends to use the adjective “predicted” to understand the meaning of the zone B3, although this word may not fully cover the idea of B3.

I: Which of the zones you would like to put your search in?

P2: That was a failure and I didn’t have much confidence. So it must be the middle one [B2: unexplained failure], since some time I could find information, [so I still have some confidence]. It is unlikely to be in this zone [B3: predict failure], if I could predict, I wouldn’t conduct such a search.

Some participants need some further explanations about the idea of zones, especially the meaning of the two dimensions. This is probably due to the fact that they saw it the first time and the terminology used was not familiarised. In these situations, the researcher tried to clarify the dimensions and zones, and sometimes a suggested zone is given by the researcher to ask whether that interviewee agreed to this allocation. However, with supports of the researcher, it is certain that all participants could finally demonstrate the zones for their searches. One typical dialogue of this is shown below.

P4: This might be in A1 or A2. What’s the difference between them?

I: If you were certain that information was on the web before searching, [that should be in A1]. A2 means that you were not certain whether information existed on the web, [but you still found it].

P4: I think I am more inclined to put it into this one [A1].

In addition, some participants were asked to remember an experience in an uncommon zone such as the opaque zone and the dark zone. They could actually recall some searching experiences or they failed to recall anything based on their understanding related to the model.

Apart from understanding the model, one participant (P2) has also given her critique to the model in terms of word use and the dimensions. It is suggested to use the word “certainty” to replace “uncertainty”. She also commented that the procedure of searching is not presented in the model, although this may because that she had not seen the whole image produced from Mansourian’s original thesis (2006).
5 Discussions

Based on the findings presented in the previous chapter, it is necessary to see how the factors related to tasks are related to the model of “cognitive invisibility”. This may also shed light to some modifications of the model.

5.1 Tasks as a factor related to zones and success & failure types

5.1.1 Inductive codes of task elements in search experiences

As stated in the methodology session, a set of a priori codes were identified from some literature around task situations in information seeking. In this session, some inductive codes are presented to enrich the coding structure. Although not all of them are directly related to task elements, they can help understand the task situations. These codes are related to four topics, purpose of search, cost to access, online information status, strategy and transformation. In addition, the meaning of a priori code “differentiating” has been extended to a more broad idea as a new code information evaluation. A table of these inductive codes is displayed below. A more detailed table, including examples and samples of interviews, is presented in the Appendix C.

<table>
<thead>
<tr>
<th>Inductive Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of search</td>
<td></td>
</tr>
<tr>
<td>academic search</td>
<td>The search is for academic purposes</td>
</tr>
<tr>
<td>everyday life search</td>
<td>The search is related to task for everyday life</td>
</tr>
<tr>
<td>entertainment search</td>
<td>The search is for entertainment</td>
</tr>
<tr>
<td>Cost of accessing</td>
<td></td>
</tr>
<tr>
<td>cost: money</td>
<td>Accessing of information needs payment</td>
</tr>
<tr>
<td>cost: distance</td>
<td>Accessing of information needs some distance to travel</td>
</tr>
<tr>
<td>cost: time</td>
<td>Accessing of information needs some time</td>
</tr>
<tr>
<td>Online information status</td>
<td></td>
</tr>
<tr>
<td>overloaded</td>
<td>Information is too much on the internet</td>
</tr>
<tr>
<td>hidden</td>
<td>Information can be hidden because of using uncommon words as its metadata, such as title</td>
</tr>
<tr>
<td>digitised</td>
<td>Information has not been digitised, maybe because it was a slightly old paper.</td>
</tr>
<tr>
<td>non-uploaded</td>
<td>An electronic version of information may have not been uploaded by its creator, may be an issue of open access.</td>
</tr>
<tr>
<td>Strategy and transformation</td>
<td></td>
</tr>
<tr>
<td>strategy: query words</td>
<td>Query words are of most importance in web searching. It is a strategy to rephrase query words.</td>
</tr>
<tr>
<td>strategy: feature of advanced search</td>
<td>It is a strategy to use some features of advanced search.</td>
</tr>
<tr>
<td>transformation: from failure to success</td>
<td>Changing strategies can lead to transformations from failures to successes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extended code</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Information evaluation</td>
<td>Including both filtering the sources by their nature, quality of the material, and evaluating the sources to see how their contents can</td>
</tr>
<tr>
<td>(extended from “differentiating” in the)</td>
<td></td>
</tr>
</tbody>
</table>
5.1.2 The relationship between codes and the zones in the model

Therefore, a code framework is determined by combining the a priori codes and inductive codes together, as shown in table 3 and table 4. According to the frequency of the codes in each zone, some relationship between codes and the zones in the model could be discovered. The two tables below show how a priori codes and inductive codes are related to the zones. Analyses of the relationships and linking to some literature are also included in the tables.

<table>
<thead>
<tr>
<th>A priori codes that have been used</th>
<th>Relationship with zones and analysis with linking to literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>fact finding</td>
<td>Happen both in the bright zone and veiled zone. More related to the bright zone. This is probably due to the fact that fact finding tasks are usually less complicated, “short-lived” and “are completed over a single session” (Kellar, Watters &amp; Shepherd, 2007, p. 1005).</td>
</tr>
<tr>
<td>information gathering</td>
<td>Happen both in the bright zone and veiled zone. Information gathering for everyday life purposes is more related to the bright zone, whereas information gathering for academic purposes is more related to the veiled zone.</td>
</tr>
<tr>
<td>chaining</td>
<td>No relationship can be discovered, since the code “chaining” appears in all three zones, except the opaque zone.</td>
</tr>
<tr>
<td>accessing</td>
<td>More related to the failure zones: the dark zone and the veiled zone. This shows the importance of accessing in differentiating success and failure. The issue of access has always been essential, as Tom Wilson described it as “a fundamental requirement”, an intervening variable, at the time when the Internet has just been created (1996, Chapter 4, 4.1.5).</td>
</tr>
<tr>
<td>networking</td>
<td>Happen both in the bright zone and veiled zone. When networking happens as a possible intervening factor or as a way of actively gathering information, it is more related to the bright zone. When networking happens as a source to show that some useful information exists, similar to the function of chaining, it can be related to a failure search in the veiled zone.</td>
</tr>
<tr>
<td>user’s perception of knowledge requirement of a task</td>
<td>Perceived low knowledge requirement is related to searches in the bright zone. The thought that a search task requires low knowledge, either comes from past experiences of a researcher or is simply because that the task looks easy to conduct. Therefore it seems clear why this factor is more related to anticipated success.</td>
</tr>
<tr>
<td>user’s perception of complexity of a task</td>
<td>Perceived low complexity is related to searches in the bright zone. The explanation of this is similar to “user’s perception of knowledge requirement of a task”.</td>
</tr>
</tbody>
</table>
Routine searches are more related to the bright zone. This seems to be obvious because users can learn to improve their search outcomes during practising.

No relationship can be found. Since it is impossible to explain why there should be a relationship between time length and zone types without taking other codes into consideration.

<table>
<thead>
<tr>
<th>Table 4 Relationships between inductive codes and zones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inductive Code</strong></td>
</tr>
<tr>
<td>Purpose of search</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Cost to access</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Online information status or barriers</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Strategy and transformation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Extended code</td>
</tr>
</tbody>
</table>

5.2 A revised model of “cognitive invisibility”
Graph 2 A revised model of “cognitive visibility”

It is thus suggested here a revised model taking task situations and other factors into consideration, along with the meaning that search failures could be transformed to search successes. It is important to note that this revised model is only a version of the original one in terms of task situations and users as postgraduate students in a social science department. A larger horizontal version of the revised model is presented in the Appendix D.

Basically, three main changes have been made to the model. Firstly, the form of the model has been changed from a rectangle to a triangle. The reason for this is to show the likelihood of searches that could happen in each zone using surface differences among these zones in the graph. It is clear that postgraduate students have more searches in the bright zone and the veiled zone than in the opaque zone and the dark zone. However, to keep the model symmetrical, the revised model does not show the idea that there seems to more successful searches than failure searches in general.

Secondly, codes that have shown to be relevant to each zones and success & failure types are put in the zones. There are no space differences within a zone, but codes that may be related to more than one zone cover the boarder(s) between zones. For example, search tasks that include chaining activities may have relationship with three zones, as shown in the table 3. Therefore, “chaining” covers 2 boarder lines in the model. This also shows the inclination of one code to a zone if it covers more than one zone. For instance, academic searches seem to be more likely to end up with unexpected failures in the veiled zone rather than anticipated successes. Thus, more surface of “academic search” is in the veiled zone.
Thirdly, two transformation lines are illustrated in the model, which represent two kinds of possible transformations: one is from the veiled zone to the bright zone; the other is from the dark zone to the bright zone. Possible factors to trigger these transformations have been suggested and are parallel to the lines in the model.

It is essential to keep the two fundamental dimensions for the model of cognitive invisibility as in the original model: the horizontal scale showing the certainty of whether information is available, and the vertical scale demonstrating perceived success and failure by users. There is, however, a small modification from “level of uncertainty” to “level of certainty” to avoid using double negation. In addition, the word “indexed” is changed to “available” to stress the idea that information that is indexed by search engines may not be accessible or available by the searchers.

The last thing to mention is that there are two types of border lines, solid line and dash line, in the revised model. The dash lines on the zone names show that they are not fully tested in the study, because no search tasks in these zones were described by the interviewees. The dash border line on “unexpected failure” shows that not all searches described in the dark zone are “unexplained”. Sometimes searchers do have their own attributions even when they are still not certain whether the information is available on the web (see 4.3.5).

6 Conclusions

To compare the revised model and the original model, it seems to be safe to say that this new version of model has incorporated more elements into the picture, is more vivid in terms of its form, although it does not aim to suggest an absolutely true picture of the actual situation.

In addition, all research aims have been answered in the study. Literature around task situations in information seeking have been identified and used to develop a priori codes. The idea of success & failure in research is also summarised in the study.

The questions (3) and (4) have been answered in more detail. It is discovered that there are some links between task situations of information seeking and the zones, success & failure types in the model of “cognitive invisibility”. Tasks that are related to everyday life search, entertainment search, fact finding, routine search and tasks that include information evaluation as strategies are more likely be categorised in the bright zone, “anticipated success”. Tasks that are categorised in the veiled zone, “unexpected failure” are all
academic searches, and are linked to accessing issues, issues of costs and status of online information, such as overloaded, non-digitised, non-uploaded and hidden. There are tasks that involve transformations from “failure” zones to “success” zones. These are all included in the revised model of “cognitive invisibility”.

The study could shed light to building the contents for teaching information literacy. A new perspective, which focuses on transformation from failed searches to successful searches, is presented in the study. It is discovered that, using various strategies, comprising of rephrasing query words, changing search tools, communicating with others about the search, enhancing information filtering and evaluation procedure can alter a potential failed search in the veiled zone or the dark zone to a successful search in the bright zone.

For studies in the future, it is suggested that research focuses could be put on other elements related to the model, such as missing of information, to see whether people’s attitude towards this have been changed.
Bibliography


Appendix A: the initial interview questions for the pilot study

What is your general feeling about searching the web? How do you find it in general?

How long have you been searching the web?

How often do you search the web?

What kind of information do you usually look for on the web?

- What specific types of information do you usually search during your study or research?

Where do you usually start your search? For example, from a website, special search engine, database of electronic papers, library website; or from a person, classmates, tutors, etc.

How satisfactory are search results for you in general?

Can you remember and describe one of your recent experience in which you were successful in web searching?

The question may cover:
- What made you to begin a search on the web?
- What is your aim of the search?
- What is your first place to seek the information?
- What made you use that as the first place to search?
- What query or click to a menu you have made?
- Have you change the place to search?
- Have you change the topic during search?
- Have you asked people about information resource or search skills?
- How do you feel during the search?
- How long is the whole search?
- How do you feel after the search?

Based on what details/ reasons do you think in this specific case you have been successful?

Could you identify the dimensions of the tasks you have just described? (A paper of task dimensions should be given to the interviewee.)

Do you always manage to find what you want on the web or do you ever not find what you have been looking for?

Can you remember and describe one of your recent experiences in which you failed to find what you have been looking for? Any specific and recent event is useful.

The question may cover:
- How do you think you need to conduct a search on the web?
- What is your aim of the search?
- What is your first place to seek the information?
- What made you use that as the first place to search?
- What query or click to a menu you have made?
- Have you change the place to search?
- Have you change the topic during search?
- How do you feel during the search?
- How long is the whole search?
- How do you feel after the search?

Based on what details/ reasons do you think this specific case was a failure?
How do you feel about your information seeking failure on the web?

Could you summarise, based on your past experiences, how do you make a difference between failure and success in searching the web?

Do you think that you always find everything exist about your search topic on the Web? I mean, in your opinion how likely is it that you miss something about your search topic?

How much does it matter to you if you know you have missed something while searching the Web? How do you feel about it?

Is there anything else you would like to add?
Appendix B: the main questions for interview in the study

Questions for the Interview

Basic Overall Information about your web searching
What is your general feeling about searching the web? How do you find it in general?
How long have you been searching the web? How many years?
How often do you search the web? Everyday? Several times a day? Or every week?
What kind of information do you usually look for on the web?
  ● What specific types of information do you usually search during your study or research?

Where do you usually start your search? For example, from a website, special search engine, database of electronic papers or OPAC; from a person, classmates/colleagues, tutors, etc.
  ● Do you prefer to search online or to ask people to gather information?
  ● Do you ask information from other people to supplement your search?

How satisfactory are search results for you in general?

Successful and failed experiences about your web searching
Can you remember and describe one of your recent experience in which you were successful in web searching?
The question related to basic information about the experience:
(The interviewer needs to cover all of these aspects, but can cover them in a different order. The order of asking questions depends on how the participant describes his/her search experiences.)

A. Story of this experience: starting point, all the things related to the task
  ● Could you describe the story of that experience?
  ● What is your aim of the search?

Task:
(The interviewer can identify the answers of some of these questions through their description without directly asking the interviewee.)

Generic facet of task
<Source of task>
Was the task self-motivated/ assigned by others/ collaborated with others (group motivated)?
<Task doer>
Was the task carried out individually/ collaboratively/ individually but in a group?
<Time: frequency, length, stage>
Was the task frequently conducted?
What was the length of the task? Is it short-term or long-term?
What was the stage that you had been in the task, begin/ middle/ final?
<Product>
What was expected to be produced after the search? (New ideas? Physical product? Factual information? Image? Mix product?)
<Process>
Was that a one-time task or a multi-time task? Was the task accomplished through one process or through repeated processes.
<Goal>
Was the goal of the task clear, explicit, concrete or on the contrary, abstract, or a mix of concrete and abstract?
Are there multiple goals of that task, or only one goal?

Common attributes of task
<Task characteristics: objective task complexity, interdependence>
How many paths do you need to accomplish the task?
Was the task conducted individually or collaboratively?
<Users perception of task: salience, urgency, difficulty, subjective task complexity, knowledge of task topic, knowledge of task procedure>
How important do you think the task was?
Did you have enough time to carry out the task?
Did you find the task easy to conduct, or difficult? Why?
In terms of the complexity of the task, do you think it was complex?
Did the topic or subject of the task require high knowledge?
Did the procedure of the task, the way of doing the task, require high knowledge?

Starting point:
- What is your first place to seek the information?
- What made you use that as the first place to search?
- Have you ask other people about the information that you need?

B. Cognitive aspects: expectation, feeling
Before you start your search, are you sure that the information you want to find is on the web?

What is your expectation before you search the web? How certain do you think the information that you want to find is on the web?

What was your feeling before you start searching? Do you feel confident, or unconfident or you don’t have a clear feeling?

Have you expected that the search would be successful before you carried it out?

Based on what details/ reasons do you think in this specific case you have been successful?

Do you always manage to find what you want on the web or do you ever not find what you have been looking for?

Can you remember and describe one of your recent experiences in which you failed to find what you have been looking for? Any specific and recent event is useful.

<Same procedure as the questions for "successful experiences", focusing on starting point, task situations, expectations and feelings, but gives slightly more focus on the reasons of failure.>

Could you summarise, based on your past experiences, how do you make a difference between failure and success in searching the web?

What are the factors you think that may be related to the outcome of the search results, that is, the success and failure of search on the web?

Do you ever have the feeling of you may have missed some information when you search on the web?

How much does it matter to you if you know you have missed something while searching the Web? How do you feel about it?

Is there anything else you would like to add?
Appendix C: A more detailed inductive codes with examples or dialogues extracted from interviews

<table>
<thead>
<tr>
<th>Inductive Code</th>
<th>Definition</th>
<th>Relationship with zones</th>
<th>Examples or dialogues extracted from the interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of search</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>academic search</td>
<td>The search is for academic purposes</td>
<td>More related to the veiled zone.</td>
<td>Searching papers on the web for the writing of literature review, mentioned by P5.</td>
</tr>
<tr>
<td>everyday life search</td>
<td>The search is a task for everyday life</td>
<td>More related to the bright zone.</td>
<td>The search experience for making decisions of choosing a major and university for studying abroad, mentioned by P4.</td>
</tr>
<tr>
<td>entertain ment search</td>
<td>The search is for entertainment</td>
<td>More related to the bright zone.</td>
<td>The experience of finding a known item, an old song, mentioned by P6.</td>
</tr>
<tr>
<td>Cost of accessing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cost: money</td>
<td>Accessing of information needs payment</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;...some of them even though I find them on Google I have to pay. So you know, then I cannot read them on paper, because I don't want to pay, because very expensive...” (P6)</td>
</tr>
<tr>
<td>cost: distance</td>
<td>Accessing of information needs some distance to travel</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;...at last I searched it in one local library in Sheffield, there is one there. But since it is too far from my home, I finally didn’t borrow that book.&quot; (P4)</td>
</tr>
<tr>
<td>cost: time</td>
<td>Accessing of information needs some time</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;…because quite difficult you know, the things I have to pay anyway it takes a lot of time, I don't want it...” (P6)</td>
</tr>
<tr>
<td>Online information status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overloade d</td>
<td>Information is too much on the internet</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;...the reason why that makes [me] confused and difficult, there are lots of papers on website, lots and lots of, in particular on Google there are so many English papers…” (P6)</td>
</tr>
<tr>
<td>hidden</td>
<td>Information can be hidden because of using uncommon words as its metadata, such as title</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;...literature may be hidden deeply, for example, the title of literature or its key words may be some words other than my query. Maybe the topic of my query is only mentioned as one aspect in literature. So it was hard for me to find that paper through search engines.” (P4)</td>
</tr>
<tr>
<td>digitised</td>
<td>Information has not been digitised, maybe because it was a slightly old paper.</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;I don't know why, maybe it was published in 1980s, it's a quite old research paper, [may not exist on the web]. So that's why I cannot find it.&quot; (P6)</td>
</tr>
<tr>
<td>non-uploaded</td>
<td>An electronic version of information may have not been uploaded by its creator, may be an issue of open access.</td>
<td>A cause of failure to searches in the veiled zone.</td>
<td>&quot;...maybe the researcher didn't put on his paper on web, so that why I cannot find it...” (P6)</td>
</tr>
<tr>
<td><strong>Strategy and transformation</strong></td>
<td><strong>strategy: query words</strong></td>
<td><strong>Query words are of most importance in web searching. It is a strategy to rephrasing query words.</strong></td>
<td><strong>A cause of success to searches in the bright zone.</strong></td>
</tr>
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<td>-----------------------------</td>
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<td>-----------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>strategy: feature of advanced search</strong></td>
<td><strong>It is a strategy to use some features of advanced search.</strong></td>
<td><strong>A cause of success to searches in the bright zone.</strong></td>
<td>&quot;…some features [of search engines]. It (a search engine) sometimes has advanced search, something more detailed, and could help you, to find the information you want in a more accurate way.&quot; (P4)</td>
</tr>
<tr>
<td><strong>transformation: from failure to success</strong></td>
<td><strong>Changing strategies can lead to transformations from failures to successes</strong></td>
<td><strong>Can happen from the veiled zone or the dark zone to the bright zone.</strong></td>
<td>&quot;As what I said previously, it is a matter of not using the right approaches, or it is because that you’ve omit it unconsciously. But maybe at last, when you improve your approaches, [the desired information] could be found.&quot; (P4)</td>
</tr>
<tr>
<td><strong>Extended code</strong></td>
<td><strong>differentiating</strong></td>
<td><strong>Including both evaluating the sources by their nature, quality of the material, and evaluating the sources to see how their contents can satisfy searchers’ needs.</strong></td>
<td><strong>More related to the bright zone. This could also be seen as a strategy that can help a search to be successful.</strong></td>
</tr>
</tbody>
</table>
Appendix D: A larger version of the revised model of “cognitive invisibility”

Graph 3 A larger version of the revised model of “cognitive invisibility”
Appendix E: Information Sheet
Hang Dong, MSc Information Systems, Information School
Email: hdong4@sheffield.ac.uk
Tel: +44-(0)7858517525

Purpose of the research
The aim of the project is to understand how the phenomenon or the theory of “cognitive invisibility” is manifested in search experiences described by postgraduate students. This can be defined as omission or overlooking of information on the web during information seeking processes by web searchers. The first objective is to understand how postgraduate students conceptualise their past successful and failed search experiences. The second objective is to know how different types of “cognitive invisibility” are related to some factors such as task situations, search habits or other elements in web searching.

Who will be participating?
The participants of the study are 7-10 current PhD and Master Students in School of Education in University of Sheffield.

What will you be asked to do?
You will be asked to participate to an interview. Several questions related to your past experiences of searching on the web will be asked. The whole interview will be recorded.

What are the potential risks of participating?
The risks of participating are the same as those experienced in everyday life.

What data will we collect?
The interviews are audio recorded only. An audio recorder borrowed from Information Commons and a smart phone, iPhone 5, will be used to record the data.

What will we do with the data?
The audio data will be stored in my private computer and smart phone. A transcript of all interview data will be created during the study. The interview data will then be analysed. After the final submission of my master dissertation, the data will be destroyed.

Will my participation be confidential?
First, the place of interview will be a private room in a public premise of the University of Sheffield, for example a group room in Information Commons. Other people except the researcher cannot hear the interview.
Second, all interview recordings will be kept confidentially and the researcher is the only people who can get access to the data.
Third, the data will be anonymised: filename of each piece of interview is the code of each participant rather than his/her real name.
Fourth, the data will be completely destroyed after the final submission of the dissertation.

What will happen to the results of the research project?
The results of this study will be included in my master’s dissertation which will be publicly available. Please contact the School in six months or contact me when you need to know further about the study. Previous master dissertations from the Information School are stored in http://dagda.sheffield.ac.uk/dispub/

I confirm that I have read and understand the description of the research project, and that I have had an opportunity to ask questions about the project.
I understand that my participation is voluntary and that I am free to withdraw at any time without any negative consequences.
I understand that I may decline to answer any particular question or questions, or to do any of the activities. If I stop participating at all time, all of my data will be purged.
I understand that my responses will be kept strictly confidential, that my name or identity will not be linked to any research materials, and that I will not be identified or identifiable in any report or reports that result from the research.
I give permission for the research team members to have access to my anonymised responses.
I give permission for the research team to re-use my data for future research as specified above.
I agree to take part in the research project as described above.
Participant Name (Please print)  Participant Signature

Hang Dong
Researcher Name (Please print)  Researcher Signature

Date

Note: If you have any difficulties with, or wish to voice concern about, any aspect of your participation in this study, please contact Dr. Angela Lin, Research Ethics Coordinator, Information School, The University of Sheffield (ischool_ethics@sheffield.ac.uk), or to the University Registrar and Secretary.
Appendix F: Letter of Approval from Information School Research Ethics Panel

Information School Research Ethics Panel

Letter of Approval

Date: 24th June 2014

TO: Hang Dong

The Information School Research Ethics Panel has examined the following application:

Title: “Cognitive invisibility” of postgraduate students' information seeking on the web: a test of Mansourian’s theory

Submitted by: Hang Dong

And found the proposed research involving human participants to be in accordance with the University of Sheffield’s policies and procedures, which include the University’s ‘Financial Regulations’, ‘Good Research Practice Standards’ and the ‘Ethics Policy Governing Research Involving Human Participants, Personal Data and Human Tissue’ (Ethics Policy).

This letter is the official record of ethics approval by the School, and should accompany any formal requests for evidence of research ethics approval.

Effective Date:

[Signature]

Dr Angela Lin
Research Ethics Coordinator

Appendix G: Access to Dissertation
Access to Dissertation

A Dissertation submitted to the University may be held by the Department (or School) within which the Dissertation was undertaken and made available for borrowing or consultation in accordance with University Regulations.

Requests for the loan of dissertations may be received from libraries in the UK and overseas. The Department may also receive requests from other organisations, as well as individuals. The conservation of the original dissertation is better assured if the Department and/or Library can fulfill such requests by sending a copy. The Department may also make your dissertation available via its web pages.

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Name: Hang Dong
Department: Information School
Signed: Hang Dong
Date: 31/08/2014

To be completed by the Supervisor – Select (a) or (b) by placing a tick in the appropriate box

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*Special restrictions

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Name: 
Department: 
Signed: 
Date: 

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