Matching database user interfaces with Ellis model of information seeking behavior: results of a qualitative survey

Mohammad Azami[1] *and Rahmattolah Fattahi*[2]

1. Faculty member of Library and Medical Information Sciences, Kerman University of Medical Sciences and PhD Student, School of Education and Psychology, Ferdowsi University, Mashhad, Iran. Email: mohammadaazami14@gmail.com

2. Faculty member of Library and Information Sciences, School of Education and Psychology, Ferdowsi University of Mashhad, Mashhad, Iran. Email: fattahirahmat@gmail.com

Abstract

User interface acts as a bridge between user and information system. Its main performance is to help and guide users through their interaction with the system. Information seeking behavior is an important factor that can enhance and improve the use of database interfaces. Therefore, it is necessary to design database interfaces based on users' information seeking characteristics in order to enhance their applicability and performances. The aim of this research was to identify the important elements and features as well as the strengths and weaknesses of database interfaces in relation to users' information seeking behavior.. Using a qualitative method based on heuristic evaluation, this research examined the graphical user interfaces of Ebsco, Proquest, Emerald and Science Direct databases and matched their characteristics with the main features of Ellis' model of information seeking behavior. Checklist and direct observation were used to collect the required data. Findings showed that interface designers rarely applied these features on the structure of studied user interface. Some features of Ellis' model, such as starting, chaining and differentiating were relatively present in these interfaces. However, other three features of this model, namely browsing, monitoring and extracting ones were not supported by them. The degree of match between these user interfaces with Ellis' model is moderate. As a result, taking information seeking behavior into account when designing user interfaces will improve them and will help their users access relevant information via databases easily.

Keywords: user interface, information seeking behavior, database interface, Ellis' model, human computer interaction

1. Introduction

Databases are the most important online information sources available via the Internet. User interface is the first and start point in information search process via wide variety of databases. Human computer interaction deals with the interaction between users and computers in order to make computer systems more user-friendly (Hewtt and Card, 2004). Use of communication and information technologies in the production, storage, retrieval, organization and dissemination of information promotes the design of user interface software and hardware (Belkin, Oddy, and Brooks, 1982a). Therefore, designers should consider the need of users and try to fulfill their expectations of information systems (Eshniderman, 1998). Considering the multi aspects of human information behavior and their various information needs, some databases are not matched with these needs. Some users can not use the system

properly. Hansen (1998) believes that designers disregard all necessary conditions and characteristics of users when they design user interfaces. Kennedy (1999) states that computer systems are often less helpful and waste users' time. Findings of research in this field confirm the evidence of existing problems such as insufficient vocabulary, complexity of search operations, lack of control tools and timely feedback in the interface designation (Clark and Frost, 2003; Ken Peng, Ramiamh and Foo, 2004; Luk, 1996; Mangiaracina and Marchetti, 1999).

Despite some advances in database structure, user interfaces are only able to fulfill a part of users' expectations. This has led them not to use effective ways to facilitate the process of obtaining information. One solution for solving this problem is to consider the information seeking behavior when designing database interfaces. Since information seeking behavior is a reflection of user needs, it is necessary to apply its requirements in the design of user interface (Marchionini and Komlodi, 1998). Effective use of some basic features in interface design can improve the use of databases and accessing relevant information.

A numbers of studies have been done on user interface, but most have focused on general and common criteria (Entezariyan and Fattahi, 2009; Fattahi and Parirokh, 2000; Nowkarizi, 2006; Zerehsaz, 2006). Then, measuring the impact of information seeking behavior on improving database graphic interface is very important. This research measures the correspondence of Ellis' information seeking behavior model to four database user interfaces. These databases include: Ebsco, Emerald, Proquest and Science Direct.

2. Methods

This study used a heuristic evaluation method . This is one of the methods basically used as usability testing in the study of human-computer interaction. According to this method, a few participants are asked to mach graphical user interface with the usability principles (Nilsen, 1995). Heuristic approach aims to identify usability problems based on human factors in designing user interface (Entezaryan and Fattahi, 2009). Ebsco, Emerald, Proquest and Science Direct are selected as research cases. These are known as the most popular resources among the scientific community, especially in the field of library and information sciences. In the heuristic evaluation, checklist is used as a tool for examining user interface. Therefore, in this research, the features of Ellis' model used as checklist to conduct the observation of studied interfaces.

Although a number of studies pointed out the benefits of using information seeking behavior features to design user interfaces (Bates 1989; Belkin, Oddy and Brooks, 1982a; Belkin, Oddy and Brooks, 1982b; Ellis, 1989; Kuhlthau, 1988; Marchionini and Komlodi, 1998; Taylor, 1968; Wilson, 1999), but it is the first time user interfaces are studied from user information seeking behavior perspective based on an information seeking behavior model.

In this study, Ellis' model (1989) is selected to evaluate the user interfaces. Ellis' model is considered as the most appropriate model in new electronic environments, such as the Web and various databases (Ellis, 1989; Wilson, 1999). This model is based on a wide variety of research and has been tested through a number of empirical studies (Agular, Choo, Delton, and Turnball, 2000, Choo, Brian, and Don, 1998; Makri, Blandford, and Cox, 2008; Wilson, 1999; Meho and Tibbo, 2000). The Ellis' first model consists of six features including: starting, chaining, browsing, differentiating, monitoring and extracting.

3. Results

In this research, user interfaces of Emerald, Ebsco, Proquest and Science Direct were matched with some of the features of Ellis' model. These interfaces were observed by the researchers to determine to what extent each feature

of the model corresponds the interfaces. Results showed that each database applied these features in its interface differently. Some interfaces supported one or more features of the model relatively. As shown in figure 1, all features of Ellis' model are supported to some extent by Emerald user interface.

Ellis' model features in Emerald user interface

The first feature of Ellis' model is called "starting". The "search buttom" as starting point is very common among the databases. For example, Ebsco and Science Direct provide various key icons (advanced, basic, simple and smart search) in their interfaces to help users for the search of needed information. However, other databases, such as Proquest, do not offer appropriate fields related to starting feature in their user interfaces. Ensco's interface offers various facilities and icons related to starting feature, such as: simple search, advanced search, expert search and etc. (Figure 2).

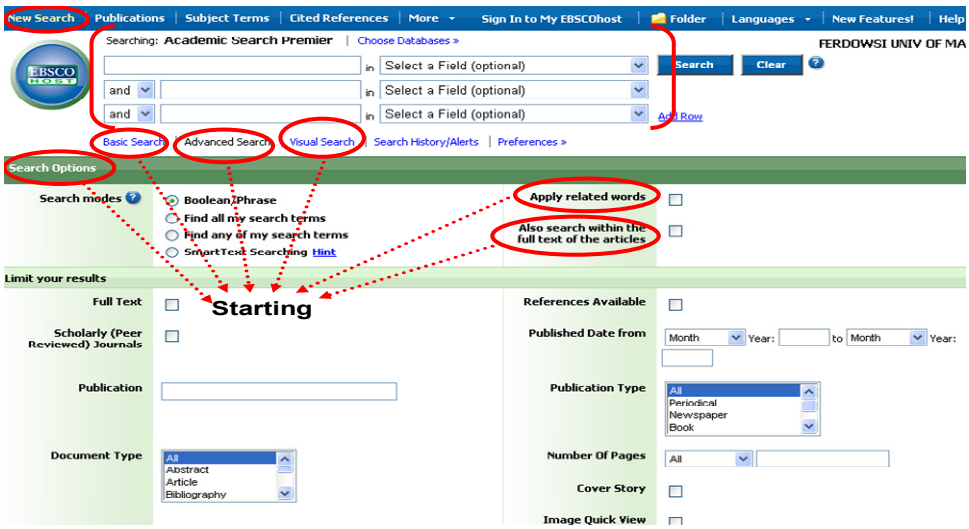

Figure 2: Starting feature in Ebsco

The second feature of the Ellis' model is known as "chaining". This feature was demonstrated on the database graphic interfaces in different ways. ScienceDirect database helps users to access "related articles" for retrieved documents (Figure 3). Proquest and Ebsco databases provide different links among all available sources. These databases also offer smart search in order to find more relevant documents. Other databases also connect a number of sources to each other through a variety of links.

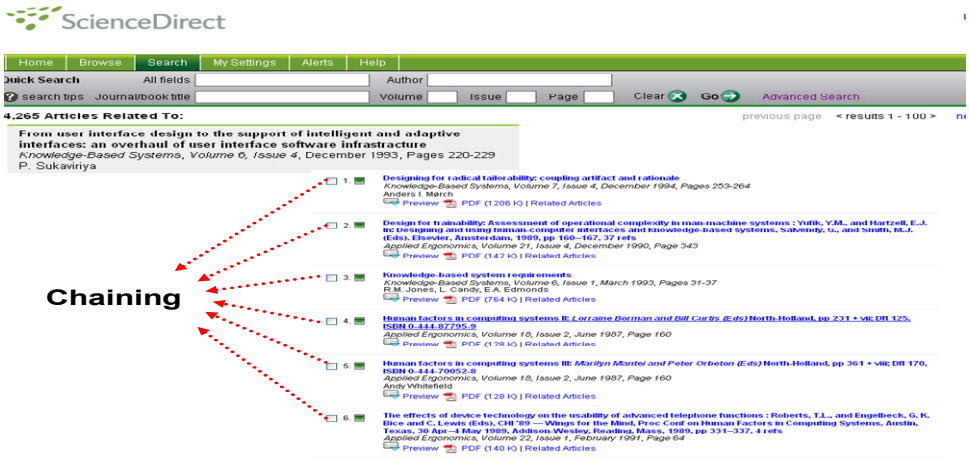

Figure 3: Chaining feature in ScienceDirect

The third feature of the Ellis' model is "browsing". While Proquest, Science Direct and Emerald databases put this feature in their interfaces, the function of this icon is not matched with the aims of "browsing" feature in Ellis' model and the needs of users. Ebsco database has completely ignored this feature. Figure 4 shows this feature in Science Direct.

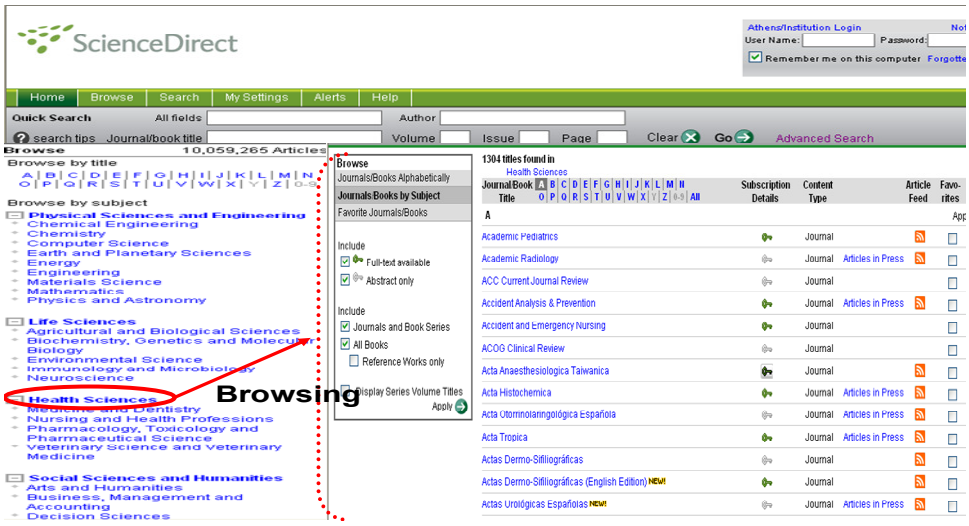

Figure 4: Browsing feature in ScienceDirect

The fourth key feature in Ellis' model is "differentiating". All studied database interfaces supply possibility of distinguishing among different sources for users through items such as: language, books, papers, year, dissertation, abstract, full text and etc. This feature in Proquest is shown in Figure 5.

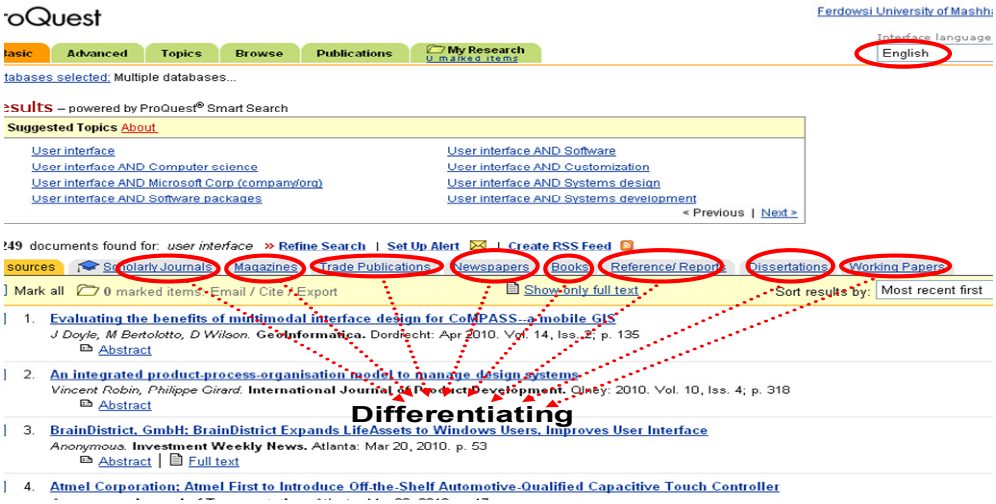

Figure 5: Differentiating feature in Proquest

The fifth feature of Ellis' model is called "monitoring". Most databases offer appropriate sources along with relevant services in order to keep users up-to-date with new and relevant information. This demonstrates monitoring feature. "Push technology" is a kind of service which provides and sends relevant information to user profiles via the web.

The sixth key feature of Ellis' model is identified as "extracting". All databases are capable to help their users to highlight sources they need through the "extracting" feature. There is also possibility of personalization for users in some of the databases. The monitoring and extracting features in Proquest are shown in Figure 6.

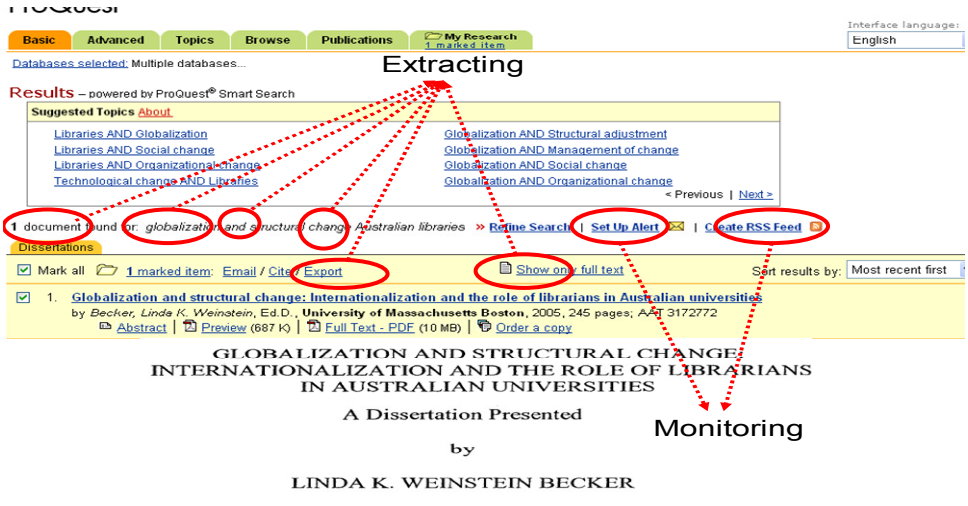

Figure 6: Monitoring and extracting features in Proquest

Table 1: Conceptual matrix of the features of Ellis' model in the user interfaces

Features / Sources	Starting	Chaining	Browsing	Differentiating	Monitoring	Extracting
Ebsco	Simple Search New Search Basic Search Advanced Search Visual Search Smart Search	Journals Archive Authors Source		Publication Year Various sources Full text Information bibliographies Authors Title	Alert services	Save Categories Download Print
Emerald	Simple Search Quick search Advanced Search Search results Modify Search	Reference URL Article	Title Subject	Document type Publication year	Current awareness services	Save Categories Download Print
Proquest	Basic Search Advanced Search Modify Search	Author Web Site Journals Archive	Research Scientific reports	Topic Publication Year Full text Article types	Current awareness services	Categories mark Save Download
Science Direct	Quick search Expert search advanced Search Smart Search Help	Quick Links Web Link Link the database Related Resources	Title Topic Journals Archive	Topic Year Sources Full text	Current awareness Services	Save mark Download Print

4. Conclusions and implications

Although the results of this study showed that some features of Ellis' model were somewhat used in the user interface of these database, but the current databases do not match with Ellis' model. It seems that interface designers are not aware of the components of information seeking behavior when designing the database interfaces. Designers must redesign database interfaces based on both user oriented and system oriented approaches (Saracevic, 1996). They must understand users information seeking patterns to help them to have better interaction with the databases and as a result, better fulfillment of their various information needs. The findings also confirmed that design of user interface should be based on models of information seeking behavior.

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