

# The Relationship between Users Cognitive Style and Information Seeking Behavior among Postgraduate Engineering Students

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## Abstract

An important issue that absorbs many attentions is studying the users' required information and their pattern of dynamic interaction with online search. The aim of this study is to identify the relationship between users' cognitive style and information seeking. It is to enhance the quality of information presentation and users' interactions in the Web by adapting their preferences and specific needs. This paper specifically focuses on the use of the Internet by postgraduate engineering students. The sample of this study consists of 50 postgraduate engineering students from the Faculty of Computer Science and Information System in Universiti Teknologi Malaysia. The findings of this study reveal the linear relationship between users' cognitive styles and information seeking.

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## 1. Introduction

During the last decade the Web has experienced continuous rates of growth to become an important information resource accessible to an increasing number of people who are using it. Information seeking behaviour is vital for improving the quality of systems designed to retrieve information (Wilson, 2000). The information needed by a user at a particular moment may be available in source(s) that can be accessed through many kinds of information channels. Students search information from a very broad range of sources and use it constantly to their preferences, whether for interest, assignment, etc (Ford, 1999). However, to determine which of the various information could provide the required information in the most useful and efficient manner is often quit difficult (Chowdhury, 2006).

People need to create a mental representation of a system or service in order to effectively utilise it. This mental representation is the reflection of past experiences, knowledge structures, belief systems, expectations and so on. In other words, the person who is using a system or service like the Internet, is seeking some context for identifying unfamiliar entity with something that is more commonplace or more easily assimilated with, existing cognitive structures (Bruce, 1999). In other words, how they search, what errors they make, what they consider relevant, which feelings they express or how much value they attach to some outcome. Marchionini (1995) emphasized that "information seeking is a generic cognitive activity." Cognitive processes determine the ways in which knowledge is assessed, filtered, stored, organised, and continually re-structured in the mind of the individual."

In order to utilize a system or service effectively, the users are require to have a mental representation of it. By this it means that past experiences, knowledge structures, systems expectations, etc should be reflected in their mental representation of the system. In other words, the user of a system or service like the Internet seeks to identify unfamiliar entities with a more commonplace tool that can be assimilated into the existing cognitive structures easily (Bruce, 1999). In order to identify what the users do and when it is done, the behavioural approach has been applied (Wilson, 2000). It identifies the users' preferences in searching, their error, their expressed feelings, and the amount of value they consider for some outcome. Cognitive processes determine the ways of assessing, filtering, storing, organizing and continually restructuring the knowledge in the mind of a person.

The studies discussed above provide valuable insights into cognitive styles and Web searching research. These are the basis upon which this study is founded. However, limited empirical research exists that show

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interrelationships between Web searching and users' cognitive style. There is a need to examine implications of users' cognitive styles of Web searching. This study aims at improving Web searching models by increasing the understanding about the effects of cognitive style on Web searching. The main goal of this study is finding relationship between users' cognitive style and information seeking.

## **2. Information Seeking and Cognitive Style**

Technology has changed the way of Information Seeking by offering a new set of alternative models. This paper illustrates the process of Information Seeking more accurately and introduces it as a dynamic activity. The Models were developed to explain the process in which the user tries to fulfil an information demand. Wilson model (1981) is among the proposed model in this area which is known as 'information-seeking behaviour'.

This model is an alternative to what has been known as 'information needs' afterwards. Clearly the diagram scope in that study is larger and it has covered the majority of what we refer as 'information behaviour' based on the model, information-seeking behaviour is resulted from a perceived need of an information user. In the second model proposed by Wilson, the basic needs are categorized as physiological, cognitive or affective. He presented a nested model for information behaviour model in 1991 which represents various fields of research in the general field of the topic as a series of nested fields. Some other studies such as Ellis (1989) and Ellis, Cox and Hall (1993), and Kuhlthau (1991) have also tried to define the information behaviour stages and features. Cognitive model of Ingwersen (1996) focused on recognition of cognition processes that can take place in any of the involved information processing elements. Saracevic (1996) proposed a model called 'stratified interaction' which is structured in the boundaries of an 'acquisition-cognition-application' model of information use. Another study in this area is Ford, Miller, and Moss (2001) who studied the function of individual differences in Web based searching. In their study, an investigation was made on the effectiveness of reported IR related to the internet perception of having no control over the internet and being too unstructured.

Detlor (2003) proposed a new conceptual framework of how organizational workers use internet-based IS. In his model stage2 refers to the information needs. Here, users are confronted with discrete problem situations that they typically faced in their work settings; each problem situation has certain characteristics called problem dimensions. It is these characteristics that determine the types of information needed to help users resolve their problems. Users in this stage become aware of the gap in their knowledge to resolve the problem situations that they encounter. Another step is the information-seeking stage where users turn to internet-based IS in obtaining the requisite information to help resolve their problems. In this stage, users examine information outputs presented to them from the internet-based interface.

Cognitive style is one of the most important individual differences in information behaviour practice and research, as it affects the ways in which events and ideas are viewed and how an individual may think, react to, represent situations and make decisions (Riding and Rayner, 1998). Since user cognitive process provides an effective theoretical foundation for understanding human-computer interactions (Gong and Zhang, 2005), it is vital to incorporate cognitive styles in Web search modelling.

## **3. Method**

The study was carried out in the Faculty of computer science and Information system in Universiti Teknologi Malaysia (UTM). The participants were 50 postgraduate engineering students that selected between first, second, and third year students from four majors. The data is collected using a questionnaire, which has been divided into three groups including demographic profile, pre-search questionnaire and post-search questionnaire that are explained as follows. At first, demographic form and a pre\_search questionnaire are completed and then a post\_search questionnaire is completed by an information seeker. Pre\_search and post\_search questionnaires are aimed at gathering information about the information seeker's state before and after their search. This leads to the measurement of any changes occurred as the result of the information seekers search. The questionnaires are based on those used in major studies of online searching described in details in the literature review (Spink, Wilson, Ford, Foster, and Ellis) with some changes in words and scale type.

The pilot study was carried out in the Faculty of Information system at UTM in the semester I, 2011. The Statistical Package for Social Science (SPSS) version 14 was used to determine the reliability of the instruments. This method focuses on the internal consistency of an instrument. Thus, a certain level of reliability of the instrument had to be set so that the new test could be assessed and improved if needed to achieve high reliability standard. The Cronbach Alpha Coefficients for information seeking, cognitive styles, and total items are shown in Table 1.

Table 1. The Instruments and Cronbach's Alpha

Instrument	Cronbach's Alpha
Information seeking	.729
Cognitive	.811
Total	.847

The data are collected from postgraduate engineering students studying in the faculty of computer science and information system in University Technology Malaysia. The collected data are then analysed using SPSS. Generating and analysing the data set are also done by the SPSS. Having generated the data set, descriptive data is generated from the data set.

#### 4. Finding and discussion

By using regression test we want to know whether there is a significant linear relationship between users' cognitive styles and information seeking. In fact, the null hypothesis evaluates whether the users' cognitive styles predicts the seeking information. More specifically, it assesses whether the correlation coefficient is equal to zero or, alternatively, whether the slope ( $\beta_1$ ) is equal to 0. To achieve this goal we can use Table 2 that represents the F test reported as part of ANOVA table and the t-test associated with the independent variable in the Table 2. According to Table 1, with an F statistic in excess of  $F(49,1) = 9.245$  and a significant level of .004 ( $p < .05$ ), the null hypothesis is rejected.

Table 2. ANOVA<sup>b</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.988	1	2.988	9.245	.004 <sup>a</sup>
Residual	14.221	44	.323		
Total	17.209	45			

a. Predictors: (Constant), Cognitive

b. Dependent Variable: Seeking

In the table of Coefficients for the regression, we can reject the hypothesis that the slope equal 0 because  $P \approx .000$ . So the results revealed that there is a relationship between users' cognitive styles and information seeking. Using linear regression, users' cognitive styles is a statistically significant predictor variable for the information seeking (Pearson  $r = 0.705$ ,  $R^2 = 0.498$ ,  $p = 0.046$ ). Table 3 represents that the slope of the regression line is 0.705. Based on the findings in Table 2, we can write the regression equation as follows.

$$\text{Information Seeking} = 1.501 + 0.705 (\text{Cognitive})$$

Table 3. Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	1.501	.386	3.891	.000
	Cognitive	0.705	.152	3.041	.004

a. Dependent Variable: Seeking

## 5. Conclusion

This paper investigates the relationship between users' cognitive styles and information seeking among postgraduate engineering students. The study found a linear relationship between cognitive styles and information seeking. The results of this study can be used in designing of user profiles based on cognitive characters. In fact the relationship between variables may be useful in the development of models of information behavior that may eventually help us respond more effectively to people's information needs. In other word, user Web interactions and connotations of Web search for their cognitive style are studied in order to explain the usage of cognitive character in construction of a user profile by presenting conceptual model. Such user profile may enhance user information seeking skills and then influence on communication and satisfaction of user who is extract of information from the website.

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