

# A preliminary study on exploratory search behavior of undergraduate students in China\*

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## Abstract

**Purpose:** This study attempts to investigate how a user's search behavior changes in the exploratory search process in order to understand the characteristics of the user's search behavior and build a behavioral model.

**Design/methodology/approach:** Forty-two matriculated full-time senior college students with a female-to-male ratio of 1 to 1 who majored in medical science in Jilin University participated in our experiment. The task of the experiment was to search for information about "the influence of environmental pollution on daily life" in order to write a report about this topic. The research methods include concept map, query log analysis and questionnaire survey.

**Findings:** The results indicate that exploratory search can significantly change the knowledge structure of searchers. As searchers were moving through different stages of the exploratory search process, they experienced cognitive changes, and their search behaviors were characterized by quick browsing, careful browsing and focused searching.

**Research limitations:** The study used only one search topic, and there is no comparison or control group. Although we took search habits, personal thinking habits, personality characteristics and professional background into account, a more detailed study to analyze the effects of these factors on exploratory search behavior is needed in our further research.

**Practical implications:** This study can serve as a reference for other researchers engaged in the same effort to construct the supporting system of exploratory search.

**Originality/value:** Three methods are used to investigate the behavior characteristics during exploratory search.

**Keywords** Exploratory search; Search behavior; Concept map; Log analysis

## 1 Introduction

With the development of computers, the Internet and communications technology, searching on the Internet has become a lifestyle. The classic question and answer

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information retrieval (IR) model is the dominant interaction model currently used in major commercial Web search engines. However, this model describes the information search process from the information system's perspective instead of the user's perspective. It cannot truly reflect the behavioral changes in the interaction process between the information system and the user or express the changing information need in the information search process (ISP). What is more, it ignores the effects of some significant factors, such as the user's background knowledge about the search topic and the usage of the information. Thus, there is a pressing need for the study of complex information needs and the information search behavior related to the Internet, as well as for the construction of a new type of Web search engine.

To some degree, any actual information needs and search behaviors are complex and exploratory. In the past three decades, many researchers have studied information search behavior, with some focusing on exploratory search behavior. In 1989, Bates proposed a berrypicking model in her paper<sup>[1]</sup>. She likened finding information to picking huckleberries or blueberries in the forest, from where they are scattered on bushes, rather than clustered in bunches. People must pick the berries one by one. Information searchers move through an information space to gather information. New information may yield new ideas so that searchers will develop a new conception of the query. They may then change their search direction, and as the search progresses, the desired outcome may also change. Bates described this approach as an "evolving search". She stated that the berrypicking model tries to reveal the role of browsing in the search process, because users must scan the results to select the information which satisfies them. In 2007, Bates demonstrated the relationship between berrypicking and browsing once again. She stated that clicking and scanning the search results can be understood as part of the information retrieval strategy. However, berrypicking emphasizes an evolving query, which shifts during the course of the search, rather than the search behavior itself<sup>[2]</sup>. In 1991, Kuhlthau proposed an ISP model which includes six stages: Initiation, selection, exploration, formulation, collection, and presentation<sup>[3]</sup>. Yet, the model mainly discusses a user's mood changes in each stage. In 1995 and 1999, Pirolli and Card's study attempted to explain information seeking behaviors in humans by presenting the information foraging theory. Central to the theory is the idea that the mechanism of information foraging is similar to that of food foraging in living organisms. When moving between information patches, searchers may select the paths to maximize the rate of the gain of information relevant to their task<sup>[4-5]</sup>. The theory is based on the premise that users' information needs are clearly defined in their minds. In 1992



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