Research on Information Retrieval Behavior Based on College Readers' Cognition

Jianfei Hu¹, Luyang Meng², Bin Zhang³
¹,²,³Library, University of Jinan, Jinan, 250022, China

Abstract: This paper takes the information retrieval behaviors of college students and researchers as the research object, and discusses the reading cognition and reading behavior habits of college readers through empirical analysis. The study found that there are large differences in reading cognition and reading needs among people of different backgrounds and levels. In the reading and retrieval behavior pattern, they are different in their grasp and use of information retrieval. The main innovation of this paper is to take the central colleges and universities as an example, and analyze the information retrieval behaviors of different levels of students in colleges and universities, and summarize the regular characteristics, which has certain demonstration significance.

1. Introduction
Informatization brings digitization, and digitalization changes the way people behave. With the advancement of society, electronic information such as books has long replaced the traditional paper book era. Modern libraries have become the most concentrated place for electronic book data, and a large amount of information is exchanged here. Informatization and digitization provide readers with a variety of search methods. Researching readers' search behavior is not only to understand the characteristics of readers' search behavior, but also to help readers improve search efficiency, and to improve the practicability of the search system. Colleges and universities are the best samples for conducting information retrieval behavior research, not only because the university library information is the most abundant and concentrated, but also because the sample of college readers has the characteristics of large amount of data, clear hierarchy and easy analysis. Therefore, this paper takes college readers as the research object, and analyzes the characteristics of information retrieval behaviors of college readers by correlating the user's cognitive behaviors with information retrieval behaviors by selecting a certain number of college readers' questionnaires and sampling and make relevant suggestions.

2. Information retrieval behavior research
Information retrieval behavior is a kind of information behavior. To study information retrieval behavior, we must first study the meaning, mode and characteristics of information behavior. It is generally believed that information behavior is the course of action of the user in order to achieve a particular goal under the control of the motivation. The research on information behavior can be traced back to the 1950s. The early research mainly focused on the combination of information behavior and information technology. User information behavior is based on motivation, combining users and information behaviors. The meaning refers to users using network tools to query, select, absorb, utilize and communicate network information under the control of information needs and motivation.
Published activities are actions and processes in which users respond and meet their information needs.

![Diagram of information retrieval mode](image)

**Figure 1. Information retrieval mode**

### 2.1 Summary of research on information retrieval behavior

User information retrieval behavior is a kind of behavior with goals, plans, and basic information needs. Generally speaking, the user's information search process includes information browsing and information retrieval. Since the beginning of research on information retrieval behavior in the 1950s, research on information retrieval behavior based on user cognition has also received extensive attention. Although the number of research papers in China has increased the trend of the people, the overall research results are not much, the content is not deep enough, and it is in its infancy, and there is a lot of room for improvement. In foreign countries, the field has received attention, and related research is rich, and there are many places worthy of reference by Chinese scholars.

#### 2.1.1 Domestic related research

At present, relevant researches in China mainly focus on the functions introduction, technology implementation and user interface improvement of existing systems, while the research on reader retrieval behavior is lacking. As far as research methods and fields are concerned, domestic scholars often find rules and problems by comparing search engines, and research is concentrated in college readers. As far as the specific content of the research is concerned, it mainly focuses on the research of readers' retrieval behavior and research on search engines from the perspective of psychology. The research results show that college readers prefer to use search engines to search for information resources, while teachers prefer to use the library to search for information to meet the needs of teaching, research, and writing academic papers. This also shows that the characteristics of the user's retrieval behavior are closely related to the user's education level and information usage.
Figure 2. Research on readers' cognition and information retrieval behavior

2.1.2 Foreign research
The objects of foreign scholars on information retrieval behavior are scattered, not only paying attention to colleges and universities, but also paying more attention to groups such as doctors, researchers, business managers and government public officials, especially medical personnel and researchers. For example, some scholars believe that the information retrieval behavior of medical personnel mainly involves three aspects: doctor information needs research, information resource utilization research, and doctor information retrieval behavior pattern research. Foreign research on reader retrieval behavior theory mainly focuses on theoretical models and research based on cognitive perspective and interaction theory. Among them, the article on retrieval behavior theory model accounts for about 40% of the total. There are also different age groups for research purposes. Bilal and Kirhy specialize in the similarities and differences between adults and children in information retrieval. There are also studies on gender, and the study found that research on women in this area is more concentrated. In the research process, it is found that the retrieval task also affects the reader's interactive information retrieval behavior. They think that the retrieval task is a variable, and the reader presents different behavior patterns according to different retrieval tasks.

2.2 Main factors affecting user information retrieval behavior
User cognition directly affects the user's search behavior. User needs act on user perception, and what kind of user demand is often there. Therefore, when researching user information retrieval behavior, we should start with user needs. The following mainly analyzes the factors affecting the user's information needs, and reflects the user's information retrieval behavior pattern through this analysis. Factors that affect user search requirements include the reader's own and external factors.

From the perspective of the reader's own factors, it is mainly related to the user's knowledge structure and social role. First, individual differences between users lead to a unique personality of information needs. For example, the knowledge structure of researchers, undergraduates, masters, doctoral students, and administrators in colleges and universities is different, which leads to differences in their user needs. Therefore, user retrieval only makes sense to match the needs of these different users. Then it is related to the user's information quality. Some users have a strong sense of information. The more information they have, the more tools and capital they have to obtain information. But at the same time, their demand for information is higher. Therefore, the information retrieval ability of people who have received better information quality education is relatively strong.

External factors mainly refer to the information system or the information source itself. The quality of information itself and the way in which information is obtained will directly affect user...
needs and then act on user information retrieval behavior. Therefore, in a network environment, if a large amount of information resources are used, the search for information is relatively easy. If there is a search tool or system suitable for retrieving the information required by the user, and its quality, convenience and economy are convenient, it will also facilitate the user's information search behavior. In addition, the accuracy and comprehensiveness of the information provided by the information organization, the ease of use of the service, the charging standard, the flexibility to adapt to changes, etc., also determine the information retrieval behavior mode. High-level, high-quality information services will stimulate the needs of information users, attract and promote users to use existing information services.

3. Analysis of Information Retrieval Behavior under User Cognition——Taking University Readers as Samples

This section adopts the research method of sample analysis. Students from five universities in Henan Province were selected as research objects for research and analysis. According to the specific characteristics of university information users, the network user groups of colleges and universities can be divided into five types: teaching and research personnel, management personnel, undergraduates, graduate students and doctoral students. On this basis, relying on the university library, analyzing and studying the information needs and behavior characteristics of college readers is of great significance for carrying out information services centered on meeting the needs of information users.

3.1 Sample selection

The five universities are Zhengzhou University, Henan University, Henan Normal University, Henan University of Science and Technology, and Xuchang University. The reason for choosing these five universities is that the five universities are located in different areas of Henan, representing the characteristics of different regions. In addition, the five colleges and universities have different levels of schooling and running schools, representing the level of different objects. Most importantly, Henan is a large population province, and the number of students is also in the forefront of the country. Research on these groups can represent the level of research objects to a certain extent.

The analysis methods are mainly questionnaire survey, library review, comprehensive analysis and so on. 500 questionnaires were sent to the five universities surveyed, and 100 college students, undergraduates, postgraduates, doctoral students, and university researchers (teachers) were selected. The ratio of male to female was 1:1. The questionnaire design includes the interest points of college students and researchers in the usual information retrieval, the main channels for obtaining information, and the main purpose of information retrieval. A total of 500 questionnaires were sent out and 480 copies were collected. Of the 20 unrecovered, all were from doctoral students, 7 out of 20 were from boys and 13 were from girls.

| School Name                          | Number of questionnaires | Questionnaire recovery quantity |
|--------------------------------------|--------------------------|--------------------------------|
| Zhengzhou University                 | 100                      | 98                             |
| Henan University                     | 100                      | 95                             |
| Henan Normal University              | 100                      | 94                             |
| Henan University of Science and Technology | 100                      | 96                             |
| Xuchang University                   | 100                      | 99                             |

Secondly, it mainly studies the background retrieval information of the above university school libraries, and finds that it can be interpreted from the time period and age. In terms of time, in the period from April to June in the peak period of non-thesis, the students' search field is mainly domestic
and foreign famous classics, entertainment novels, fashion fitness or professional knowledge related to
the profession, but at the peak of the thesis writing, the students search More related to the topic of the
paper. In addition, the search behaviors of junior college students and undergraduates are relatively
consistent, and graduate students have changed in research depth. Doctoral students and researchers
generally show a relatively in-depth research orientation.

Figure 3. Questionnaire reflects the main areas of student search

3.2 Trend and characteristics analysis
After investigation and analysis, we can find that the information search of college readers presents the
following trends and characteristics.

First of all, in the use of tools, the research object generally uses only simple retrieval strategies,
and rarely uses restrictive retrieval such as logical retrieval, truncation retrieval, and phrase retrieval,
and only a few people can correctly use advanced retrieval functions. The group that can use advanced
search is also generally a group of graduates or above. There are also many students who don't know
anything about professional search knowledge, such as advanced search techniques and search-based
questioning.

Secondly, in the retrieval of vocabulary, college students tend to adopt a single search term. As the
minimum unit for expressing user information requirements and writing search questions, the choice
of search terms is very important, and the quality of the selected search words will directly affect the
search results. The study found that the proportion of subjects who can use the search terms is small,
and the selected search terms are either too large or too small.

Finally, there are some regular features at the user's needs and academic level. Overall, the higher
the degree of education, the stronger the ability to select keywords and use search technology.

4. Revelations and suggestions
Based on the above empirical analysis, the following three recommended measures are proposed.

4.1 Adhere to the user-centered, multi-channel to improve the information capabilities of network
users. It is necessary to give full play to the unique advantages of university libraries as a school's
knowledge management center and information quality education center, strengthen information
training, and provide different training for users with different scientific and technical backgrounds.
Differentiating between different objects can be based on the principle of “what to use, what to focus
on, what is missing, what to supplement”, and to use short-term training courses and lectures to
improve their ability to use network information resources.
4.2 Be good at integrating network resources and providing personalized and specialized information services. Colleges and universities should adhere to the concept of satisfying the increasingly sophisticated information needs of information users, effectively organize and dynamically integrate network information around the information needs of users, and do a good job of integrating network information resources. The library should be good at carrying out personalized and professional services, and timely push relevant information resources or search results directly to the user's desktop, and at the same time, carry out information analysis and forecasting for different users' specific needs, and develop information value-added services.

4.3 Be good at using the network to carry out digital reference services. The Digital Reference Service is a personalized service for users who have specific knowledge and skills to consult “experts”. In the network environment, as the number of information needs of university information users increases, the requirements for the quality and mode of information services are not increased. Therefore, colleges and universities should keep up with modern information technology, provide digital reference consultation, and extend service time to provide users with more extensive knowledge.

5. Conclusion
The Internet has unique advantages in the richness of information resources, the speed of information transmission, the wide range of resource sharing and low cost. The universities in the world are at the forefront of using Internet technology to carry out information services. Especially in recent years, more and more researches on information retrieval behavior based on the cognitive behavior of college readers have obtained some consensus. Based on the investigation of the central colleges and universities, this paper deepens the understanding of college readers' information retrieval behavior and draws the basic conclusions: First, the information search behavior of college readers is related to the level of education. The higher the level of education, the stronger the search ability. Second, college students' information retrieval behavior is directly related to user needs, and students have a strong demand for information retrieval at the peak of the paper.

References
[1] Martínez-Peñas, Umberto. Private Information Retrieval from Locally Repairable Databases with Colluding Servers[J]. 2019.
[2] Yao X , Liu N , Kang W . The Capacity of Multi-round Private Information Retrieval from Byzantine Databases[J]. 2019.
[3] Mabrouk D , Rady S , Badr N , et al. A survey on information retrieval systems' modeling using term dependencies and term weighting[C]// Eighth International Conference on Intelligent Computing & Information Systems. IEEE, 2018.
[4] Heccheol Y , Wonjae S , Jungwoo L . Private Information Retrieval for Secure Distributed Storage Systems[J]. IEEE Transactions on Information Forensics and Security, 2018, 13(12):2953-2964.
[5] Zhang W . Generative Adversarial Nets for Information Retrieval: Fundamentals and Advances[J]. 2018.
[6] Shariatpanahi S P , Siavoshani M J , Maddah-Ali M A . Multi-Messagge Private Information Retrieval with Private Side Information[J][C]// 2018 IEEE Information Theory Workshop (ITW). IEEE, 2018.
[7] Jidong X , Lei L , Hai H , et al. Virtual Machine Extrospection: A Reverse Information Retrieval in Clouds[J]. IEEE Transactions on Cloud Computing, 2018:1-1.
[8] Mohan S , Fiorini N , Kim S , et al. A Fast Deep Learning Model for Textual Relevance in Biomedical Information Retrieval[J]. 2018.
[9] Wei Y P , Ulukus S . The Capacity of Private Information Retrieval with Private Side Information Under Storage Constraints[J]. 2018.