

# Survey on the Current Situation and Potential Needs of Search Engine Usage among College Students in Yantai City

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## ABSTRACT

This study conducts empirical research based on the current problems in the use of search engines in China. Based on the understanding of the cognitive, attitudinal, and behavioral patterns of college students towards search engines, the author conducts a survey on the current situation and potential needs of search engine use among college students with different characteristics. Based on the evaluation of search engine usage experience by college students, the author systematically summarizes the shortcomings in the current development process of search engines, understands the latest expectations of college students about search engines, and explores more suitable development models for search engines. Based on the different characteristics of college students, this study explores their personalized needs for search engines, and proposes targeted and reasonable modification suggestions based on the actual application of search engines. With the goal of achieving optimal user experience, the study aims to further offer advice on optimizing search engines, improving user experience and satisfaction, and meeting the personalized and diversified needs of users.

**Keywords:** *Search engines, College students, Questionnaire survey.*

## 1. INTRODUCTION

With the continuous development of Internet applications, information search has become an important means for people to obtain information daily. Search engines have become the preferred tool for the vast majority of users to obtain information, gradually becoming an indispensable part of people's daily lives. [1] In recent years, the search engine market in China has developed rapidly both domestically and internationally, and major search engine enterprises are constantly improving the service functions and quality of their search engines in competition, enabling them to better meet the user experience. "When you have a problem, Baidu it" is not only a slogan, but also has become a way of life for people in the Internet era.

The number of search engine users in China has been rising steadily all the year round, and the level of Internet intelligence is also rising. The characteristics of social information personalization are becoming more and more obvious, which requires more and more personal information

literacy. The daily use of search engines by college students is becoming increasingly common, involving both learning and daily life. In today's era of informatization and networking, the evaluation standards for search engines are not the same, and the competition pressure for academic and employment has increasingly high requirements for the comprehensive quality of college students. Search engines are an important way for college students to obtain information resources during their learning stage and after work. However, currently, many users often find that their search results are either numerous, irrelevant, or even have no relevant results when searching for information on a vast network. The increasing proliferation of disordered and unrelated network information content has led to a widening gap in the correlation between search results and user search needs. [3] College students are increasingly dependent on online search engines when obtaining the necessary information resources. However, due to the uneven quality of search engines, the information literacy and retrieval ability of college students have

limitations, making it difficult to comprehensively and accurately retrieve the information they need. [2] In the increasingly mature environment of text, voice, and even image search, how college students can make good use of online search engines to obtain the necessary information resources is a very thought-provoking issue. [3] This study takes college students in Yantai City as an example, explores better development models suitable for search engines through on-site investigation and data mining, optimizes search engines, and meets the personalized and diversified needs of users.

## 2. RESEARCH PLAN DESIGN

### 2.1 Survey Subjects

Considering that the purpose of the survey is to understand the current situation and potential demand of college students for search engine usage, the survey subjects are college students. In order to control bias and increase the representativeness of the survey subjects, there are comprehensive universities, as well as normal universities, finance and economics universities, and agricultural universities in Yantai City. Therefore, the researchers selected college students from different types of colleges and universities in Yantai City as the survey population.

### 2.2 Sampling Methods

This study adopts a stratified sampling method to qualitatively evaluate the current status of search engine usage among college students, the survey of existing search engine problems, and future search engine expectations through questionnaires. To ensure the reliability of the survey questionnaire, the researchers conducted a pre-survey with a sample size of 100 before conducting the formal survey. During the survey process, issues such as questionnaire response rate and reasonable question setting were identified, and modifications were made to address these issues to ultimately determine the questionnaire for this survey. A total of 550 questionnaires were distributed, and 530 were collected. 509 valid questionnaires were collected, with an effective rate of 92.55%.

### 2.3 Data Processing

The researchers used SPSS 26.0 statistical software to conduct statistical analysis on the input data, used statistical tables to conduct descriptive analysis on the current status, evaluation, and

influencing factors of search engine usage among college students, described qualitative data with frequency and rate, conducted single factor analysis by chi-square tests, non-parametric tests, etc., and used logistic regression and other methods for multiple factor analysis.  $P < 0.05$  indicates a statistically significant difference.

## 3. RESULTS

### 3.1 Current Usage of Search Engines

In the survey on the current use of search engines, 56.19% of college students first use search engines when they want to search for information, while 43.42% of people choose to use search engines when they cannot find enough information on frequently visited websites. When college students obtain the necessary information resources, their dependence on online search engines is becoming stronger. 49.02% of college students believe that search engines are complementary to each other and one of the multiple channels for obtaining information. 39.57% of college students believe that search engines are essential and the main source of information for work and life. From this, it can be seen that search engines have become an indispensable part of people's real life, closely related to people's lives, studies, and work. For college students, they are even more essential learning tools. When studying the usage habits of search engines among college students, it can be found that 32.22% of them are accustomed to using a few keywords, followed by a single keyword, a whole sentence, or all three methods. When search engine results cannot meet the needs, most college students will choose to change keywords and search again, or add keywords and search again. Occasionally, they will also try different search engines to search.

A survey found that Baidu is the most commonly used search engine among college students, followed by 360 and Sogou search engines. In addition to these most commonly used search engines, they also choose to use Google, while using search engines such as Bing and Yahoo less frequently. It can be seen that common Chinese search engines are the primary search choice for contemporary college students, and foreign search engines are only more outstanding than Google. According to data from market research institutions, Baidu, as the world's largest Chinese search engine, had a global market share of 1.76% in 2021, with a high market share of 86.82% in China, ranking first

domestically. Google is the world's largest search engine, with a global market share of 91.40% in 2021 and a Chinese market share of only 2.93%. Through data, it can be found that Baidu is far ahead in the domestic market in China, but lags behind in the international market, far behind Google.

### **3.2 Advantages of Search Engines**

#### **3.2.1 Important Ways to Obtain Information**

The vast majority of college students agree that the user experience of commonly used search engines has improved compared to five years ago. Compared with the earliest search engines, today's search engines have indeed made significant improvements in terms of query functions. The use of search engines allows people to quickly obtain varied information by using only a few keywords. The use of search engines has greatly facilitated student information acquisition, increased channels for information acquisition, and provided varying degrees of assistance to students in their daily life, academic studies, future employment, and other related inquiries.

#### **3.2.2 Providing Efficient, Diverse, and Personalized High-quality Services**

When college students use search engines, they often browse content such as leisure, entertainment, and news, accounting for over 50% of the total. 44.2% are used for learning materials, literature and books, 49.9% are used for real-time information such as weather and transportation, and 27.5% are used for computer applications such as software, games, and antivirus. It can be seen that search engines can help users to search for the information they need from the huge information resource database on the Internet at the fastest speed through technical means, providing users with simple, efficient and high-quality services [6]. And currently, the diversified and personalized services provided by search engines have attracted the public's attention, adding fun to search to a certain extent and increasingly meeting user's needs. The future of search engines is unknown, but it is bound to be bright. They will be more intelligent, user-friendly, efficient, and more in line with people's needs. The development of third-generation search engines is progressing vigorously, and search engines will play an increasingly important role in the future.

### **3.3 Shortcomings of Search Engines**

#### **3.3.1 Low Recall and Precision Ratio**

Regardless of the type of search engine used, precision, recall, and response time remain the fundamental concerns of users in practical use. However, currently search engines have not been able to cover all Internet resources, and even the most fully functional search engines can only find about one-third of the web pages, making it impossible to guarantee recall. On the other hand, due to the massive and disorderly network resources, invalid links on web pages, duplicate query results, mirrored results, results pointing to other pages or links, inability to open found pages, and expired information, search engines have greatly reduced their search rate. [7]

In the survey on the shortcomings of current search engines, the most troublesome factor when using search engines is that 60.12% of them cannot find or have inaccurate results. In the survey on the shortcomings of search engines in terms of search content, 64.24% and 61.89% believe that search engines cannot accurately judge the true needs of users and the search result information is not comprehensive enough, both exceeding 60%. The reason for the complexity of search results is due to the imbalance between encoding and decoding, which leads to information overflow and decreased reliability. The amount of information containing keywords in the search results is huge. In addition, besides the serious imbalance in the amount and type of encoding and decoding, there is also an uneven quality of this information. Because search engines also encode the ranking of this information in order to maximize its relevance to the user's target information. However, the coding standards for this ranking are neither stable nor uniform [8]. There are problems with limited information coverage, low completeness and accuracy, which to a large extent cannot meet the true needs of users.

#### **3.3.2 A Large Amount of Advertising Information**

According to a survey, the most common issue among users regarding the appearance of search engines is that there are too many ads on the search interface, accounting for 62.48%; In the survey on the problem of using search engines, 45.19% of respondents reported excessive advertising information. Bidding ranking originated in search engine technology and is a commercial service in

which service providers artificially intervene in natural search results under the operation of technology. However, many illegal phenomena have also emerged, especially the false advertising, trademark infringement, and unfair competition caused by arbitrarily setting others' trademarks as search keywords, which have caused widespread controversy. [9] During the process of using search engines, the placement of commercial advertisements through bidding ranking has an impact on search results, and the implementation of search engine marketing has brought negative impacts to these user experiences [10].

### *3.3.3 Slow Response Speed*

In the survey on the most troublesome factors when using search engines, 58.15% of college students chose to have slow search response speed, and 37.13% believed that search engines should be optimized in terms of search response speed. College students nowadays prioritize efficiency in both their studies and daily lives. They do not spend too much time viewing search results, and the response speed of search results is an important factor affecting their choice of search engines. At present, there is still a problem of slow search response speed in search engines. In a survey of college students who encounter situations where "the page cannot be displayed" or "the page has been deleted" when searching for content using search engines, 46.56% of college students choose to automatically display popular search content recommended by the system, and 38.9% of college students choose to automatically redirect to the search homepage. In this fast-paced information age, search response speed is particularly important. Network information is growing exponentially every day, and search engines not only need to supplement new information in a timely manner, but also should regularly delete expired and worthless information, such as invalid links and inaccessible web pages; Comprehensive search engine databases are vast, difficult to update, and information quality is also difficult to ensure. Low quality and invalid information reduce search engine accuracy and also affect users' convenient and efficient access to valuable information [7].

### *3.4 Potential Demand for Search Engines*

In the survey on the factors that college students consider when choosing search engines, the composition ratios of whether it is easy to use and the amount of information are 63.65% and 57.37%,

both exceeding 55%, followed by the completeness and accuracy of information. In a survey on the expected optimization of search engine appearance, nearly 60% of college students choose the overall color tone of the page and the overall appearance of the search page, and 49.31% of college students choose recommended content below the search box; In terms of content, over 50% of college students choose the accuracy of search results and the timeliness of information updates. College students place greater emphasis on the simplicity of search engine operation, the amount of information, the overall appearance and cleanliness of search pages, the accuracy of search results, and the timeliness of information updates.

## **4. ANALYSIS OF THE DEVELOPMENT TRENDS OF SEARCH ENGINES**

With the development of mobile services, technology, and changes in people's lifestyles, search engines will undergo significant changes in the future. Nowadays, the Internet generates huge amounts of new data every day. How to store the massive data mined from the Internet will bring great challenges to the search engine server. The existing distributed storage technology has to some extent solved the current data storage problem. However, in the future, the growth rate of data volume will far exceed the present, and the types of data will also become more diverse. How to effectively organize and store massive and diverse data will be a development hotspot for future search engines [11]. Search engines can achieve more professional, accurate, and effective information retrieval by utilizing artificial intelligence technology to analyze and judge the true intentions of users, making it more convenient for users to use search engines and greatly improving user satisfaction [13]. It is hoped to see more user-friendly engine tools in the development process of future search engines, making searches faster, better, and stronger, and making search engines people's most caring friends and partners. The intelligent search engine that combines artificial intelligence technology can improve information search from the current keyword based level to the knowledge (or concept) based level. The intelligent search engine can interact with users using natural language. Natural language search conforms to people's language habits, and is as easy, direct, and convenient as communication between people, without being limited to traditional search methods such as classification and keywords. This

undoubtedly provides users with great convenience. Integrating "language computing", cloud search service technology, and artificial intelligence will make the results returned by computers more targeted, displaying accurate information in the first two or three search results [14]. It can also enable computers to possess human intelligence and logical analysis capabilities, understand the semantics expressed in natural language, and achieve more accurate matching between search results and user's needs.

## **5. DISCUSSIONS**

### ***5.1 The Necessity to Improve College Students' Ability to Search Information***

Nowadays, college students should be digital "natives" who are very familiar with computers and the internet, and also have some skills in searching for online information. According to statistics, 68% of students would choose search engines such as Google and Baidu as their preferred channels to solve problems, believing that "if there are problems, find Baidu" is enough. [15] Except for some senior students or students who have studied information retrieval courses, they can choose specialized databases such as CNKI, Wanfang, and VIP to search for the required academic information resources. Most students prefer to use search engines to search for the required information resources, such as powerful search platforms like Baidu and Google, or professional search engines like Google Academic and Baidu Academic [16]. However, at the same time, there is a certain lack of information literacy ability among college students, and it is necessary to improve their own information literacy and retrieval ability, and further use search engines scientifically and efficiently.

### ***5.2 Requiring Rich Content Presentation Instead of Flashy Advertisement***

A survey found that the general public is troubled by a large amount of advertising information when using search engines, and the proportion of respondents who choose "too many search interface ads" in the search engine appearance survey is high. From the overall color tone of the page chosen by the public, the overall appearance of the search page, and the appearance of the homepage of the recommended content below the search box, the search engine interface should be simple, clean, and clear at a glance,

without the need for sensationalism. The mission of search engines itself is to solve the search queries of netizens, not to be a platform for selling products. This should be the original intention of making search engines, and also the essential difference between search engines and e-commerce platforms. Even it is as simple as displaying a title with a description, it can already meet the basic needs of user search and the presentation of content, without the need for various fancy display forms.

### ***5.3 The Need of Search Engines to Not Forget Their "Original Intention" to Achieve Long-term Success***

A good search engine requires technology and content to support it. It can be said that technology determines the search experience, while content is the foundation of search. Finally, always remember the original intention of doing a good job in search engines: user experience, because user experience determines whether a product can go long-term. Based on the principle of "meeting user's needs", the developers of search engines should strive to continuously optimize and improve ourselves, fully understand user needs, and provide users with a truly intelligent and personalized information filtering and push service, providing a better user experience.

### ***5.4 The Requirements of Search Engines to Not Sacrifice User Experience for Development***

Any search engine platform is seeking development and obtaining corresponding benefits from it. The approach is often reflected in inserting various advertisements through the search start and result interface to achieve profitability, which inadvertently sacrifices user experience. To make a profit, the platforms can charge website owners a reasonable annual entry fee, but it is not a competitive ranking, it is only a deposit for the search platform to capture website content. The results of search engines should be fair, just, and publicly available content, and should be a public service platform. There should be no bidding ranking, and all search results should be determined by the user experience. More parameters that truly reflect user satisfaction with the content, such as likes, favorites, reviews, etc., should be added appropriately. The public should be encouraged to participate, and after the search platform crawls the content, it should not be redirected to the corresponding domain name after opening the page.

It should be retained on the search engine platform, only showing that the website content is the same as the domain name.

### **5.5 Promoting the Construction of One-stop Search**

One-stop search is the integration of various related information such as images, news, stocks, etc. into the same result interface, allowing users to obtain all the requirements in one query. It allows users to enter the query target only once and obtain various related search results in the same result interface, providing users with a unified search portal that is simple and convenient to operate, rich in information types, accurate and efficient.

### **5.6 Creating a Specialized Search Portal for Search Engines**

A thematic search engine is a query tool specifically designed to search for information about a particular discipline or topic. When a user purposefully opens a search window, they may only be very interested in one aspect of knowledge and not interested in other aspects of knowledge, then they need to conduct a thematic search. For example, if users are only interested in academic topic content, academic topic searches can clearly better meet their needs.

## **6. CONCLUSION**

In short, as aborigines in the Internet era, college students have high requirements for the universality and quality of the use of search engines. Therefore, search accuracy, timeliness of information, conciseness of content, and responsiveness of websites are all the needs of college students when using search engines. Finding the best, most clear, and latest results at the fastest speed is a consistent demand for search engines among college students and other users. Therefore, how to improve the ability of college students to use search engines and how to further standardize and optimize the service quality of search engines are urgent issues that need to be considered and solved.

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