



## Review Article

# Information Seeking Behavior of Pharmacy Students in Academic Libraries: A Comprehensive Review

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### ABSTRACT:

Information seeking behavior (ISB) is a fundamental component in the academic and professional development of pharmacy students, as it directly influences their ability to access, evaluate, and apply relevant scientific and clinical information. In the modern academic environment, where information is rapidly expanding and increasingly digitized, understanding how students interact with information systems has become crucial for educators, librarians, and policymakers.

This review aims to critically analyze the information seeking behavior of pharmacy students within academic libraries, focusing on their information needs, preferred sources, search strategies, and the challenges they encounter during the information retrieval process. The study is based on a comprehensive review of scholarly literature retrieved from major databases such as Scopus, PubMed, ScienceDirect, and Google Scholar. Emphasis is placed on studies published between 2015 and 2025 to ensure contemporary relevance.

The findings reveal a significant shift in user behavior from traditional print-based resources to digital platforms, including electronic journals, bibliographic databases, and web-based search engines. Pharmacy students demonstrate a strong preference for easily accessible and time-efficient information sources, often relying on general search engines as their primary tools. However, despite the availability of advanced digital resources, many students lack the necessary information literacy skills required to effectively navigate and utilize these tools.

The review also identifies several barriers affecting information seeking behavior, including information overload, inadequate search skills, limited awareness of library services, and technological constraints. Furthermore, the evolving role of academic libraries is highlighted, emphasizing their transition from traditional repositories to dynamic, user-centered knowledge hubs that provide digital access, training, and research support.

The study concludes that enhancing information literacy, improving digital infrastructure, and adopting user-centered library services are essential strategies for optimizing information seeking behavior among pharmacy students. These improvements will ultimately contribute to better academic performance and the development of competent healthcare professionals.

**Keywords:** Information Seeking Behavior, Pharmacy Students, Academic Libraries, Information Literacy, Digital Resources, Evidence-Based Practice

### INTRODUCTION:

The discipline of pharmacy occupies a central position within the healthcare system, integrating scientific knowledge, clinical expertise, and patient-centered care. As future healthcare professionals, pharmacy students are expected to develop competencies that extend beyond theoretical understanding to include the ability to interpret, evaluate, and apply complex information in real-world contexts. This requirement underscores the critical importance of **information seeking behavior (ISB)** as a foundational skill in pharmacy education [1,5,38].

Information seeking behavior is a multidimensional construct that encompasses the processes through which individuals recognize information needs, identify appropriate sources, retrieve relevant information, critically evaluate its quality, and apply it effectively to solve problems or make decisions [1,2,73]. In the context of pharmacy education, ISB is not only essential for academic success but also for the development of evidence-based clinical practice, which is a cornerstone of modern healthcare [38,39].

The evolution of the information environment has profoundly influenced how students engage with knowledge. Historically, academic libraries served

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as the primary repositories of scholarly information, providing access to printed books, journals, and reference materials. However, the advent of digital technologies has transformed these traditional systems into complex, hybrid information ecosystems characterized by electronic databases, digital repositories, and online learning platforms [53,54].

This digital transformation has significantly altered students' information seeking patterns. Pharmacy students now have access to vast amounts of information at their fingertips, enabling them to retrieve data quickly and efficiently. However, this abundance of information also presents challenges, including **information overload**, difficulty in evaluating source credibility, and the potential for misinformation [52,23].

Moreover, the increasing reliance on general search engines and freely available online resources raises concerns regarding the quality and reliability of information accessed by students [60]. While these tools offer convenience and speed, they often lack the rigor and credibility associated with peer-reviewed academic databases.

Another critical factor influencing ISB is the level of **information literacy** among students. Information literacy encompasses a set of skills that enable individuals to effectively locate, evaluate, and use information. Despite its importance, studies indicate that many pharmacy students lack adequate training in information literacy, which limits their ability to fully utilize available resources [42,43].

The role of academic libraries has also evolved in response to these changes. Modern libraries are no longer passive repositories of information but active facilitators of knowledge creation and dissemination. They provide a range of services, including access to digital resources, information literacy training, and research support, all of which are essential for enhancing ISB among students [44,46].

Furthermore, the integration of **evidence-based practice (EBP)** into pharmacy education has increased the demand for high-quality information. Students must be able to critically appraise scientific

literature and apply research findings to clinical scenarios, making effective information seeking skills indispensable [38].

In addition to technological and educational factors, psychological and social elements also play a significant role in shaping ISB. Students' confidence, motivation, and prior experiences influence how they approach information seeking tasks. Models such as Kuhlthau's Information Search Process highlight the emotional aspects of information seeking, including uncertainty, anxiety, and eventual confidence [4].

Given these complexities, there is a growing need to comprehensively understand the information seeking behavior of pharmacy students. Such understanding can inform the development of targeted interventions, including curriculum design, library services, and training programs aimed at improving information literacy and research skills.

This review therefore aims to provide an in-depth analysis of ISB among pharmacy students, examining their information needs, preferred sources, search strategies, challenges, and the evolving role of academic libraries in supporting their learning and professional development.

## OBJECTIVES OF THE STUDY:

The primary objective of this study is to conduct a comprehensive and systematic examination of the information seeking behavior of pharmacy students within academic environments. This objective is grounded in the broader framework of information behavior research, which seeks to understand how individuals interact with information systems in various contexts [5,73].

A key objective is to explore the **nature and characteristics of ISB** among pharmacy students. This involves analyzing their behavioral patterns, motivations, and preferences in relation to information seeking activities [9,11]. Understanding these characteristics is essential for identifying gaps in knowledge and areas for improvement.

Another important objective is to identify the **diverse information needs** of pharmacy students.

These needs vary across different stages of education and include academic, research, clinical, and professional requirements [29,35].

The study also aims to examine the **range of information sources** utilized by students, including print materials, electronic databases, and online platforms. This analysis helps determine the extent to which students rely on credible and authoritative sources [50,53].

In addition, the study seeks to analyze the **search strategies and techniques** employed by students during information retrieval. This includes both basic and advanced methods, as well as the effectiveness of these strategies in obtaining relevant information [41,66].

Identifying the **challenges and barriers** that hinder effective information seeking is another critical objective. These barriers may include lack of skills, limited access to resources, and information overload [52,61].

The study further aims to evaluate the **role of academic libraries** in supporting information seeking activities. This includes assessing the availability of resources, training programs, and research support services provided by libraries [44,46].

Finally, the study seeks to provide **evidence-based recommendations** for improving information literacy and enhancing library services, thereby supporting the academic and professional development of pharmacy students [42].

## METHODOLOGY:

This study employs a **narrative review methodology**, which is particularly suitable for synthesizing and interpreting findings from diverse sources of literature. Unlike systematic reviews that focus on specific research questions, narrative reviews provide a broader perspective, allowing for the exploration of complex topics such as information seeking behavior [5].

The research process involved a comprehensive search of multiple academic databases, including

Scopus, PubMed, ScienceDirect, and Google Scholar. These databases were selected for their extensive coverage of scientific, medical, and educational research [41].

A well-defined search strategy was developed using relevant keywords and Boolean operators. Keywords such as “information seeking behavior,” “pharmacy students,” and “academic libraries” were combined using operators like AND and OR to refine search results and ensure relevance [41,66].

The inclusion criteria were carefully defined to ensure the quality and relevance of selected studies. Only peer-reviewed journal articles published between 2015 and 2025 were included, with a focus on research related to ISB in healthcare and educational contexts [40].

Exclusion criteria included non-academic sources, duplicate studies, and articles that did not directly address the research topic. This ensured that the analysis was based on reliable and relevant data [5].

The selected studies were analyzed using a **thematic approach**, which involved categorizing the literature into key themes such as information needs, sources of information, search strategies, challenges, and the role of libraries [47].

This approach allowed for a structured and comprehensive analysis of the topic, highlighting patterns, trends, and gaps in existing research. The findings were then synthesized to provide a cohesive understanding of ISB among pharmacy students.

## THEORETICAL FRAMEWORK:

The study of information seeking behavior is grounded in several theoretical models that provide insights into how individuals interact with information systems. These models offer valuable frameworks for understanding the complexities of ISB among pharmacy students.

Wilson’s model of information behavior is one of the most widely used frameworks in this field. It emphasizes the relationship between information needs and information-seeking actions, while also considering the influence of psychological, social,

and environmental factors [1,2]. The model highlights barriers such as lack of access, insufficient skills, and organizational constraints, which can affect the effectiveness of information seeking.

Ellis's behavioral model identifies a set of common activities associated with information seeking, including starting, chaining, browsing, differentiating, monitoring, and extracting [3]. These activities are particularly relevant for pharmacy students engaged in research and academic assignments, as they reflect the iterative nature of information seeking.

Kuhlthau's Information Search Process (ISP) model introduces an important dimension by focusing on the emotional and cognitive aspects of information seeking [4]. The model describes stages such as uncertainty, exploration, and confidence, highlighting the psychological experiences associated with each stage.

In addition to these models, other theoretical perspectives such as **Bates' berrypicking model** and **Dervin's sense-making theory** provide further insights into the non-linear and context-dependent nature of information seeking [7,8].

These theoretical frameworks collectively emphasize that information seeking is not a simple, linear process but a complex and dynamic activity influenced by multiple factors. For pharmacy students, understanding these models can help improve their approach to information seeking and enhance their ability to effectively utilize available resources.

## **INFORMATION NEEDS OF PHARMACY STUDENTS:**

Pharmacy students exhibit highly diverse and dynamic information needs that evolve throughout their academic journey and professional training. These needs are shaped by curricular requirements, research expectations, clinical exposure, and the broader healthcare environment. Understanding these needs is essential for designing effective information systems and library services [29,35,73].

At the foundational level, pharmacy students have **academic information needs**, which include access to textbooks, lecture notes, laboratory manuals, and reference materials. These resources provide the theoretical framework necessary for understanding core subjects such as pharmacology, pharmaceuticals, medicinal chemistry, and pharmacognosy [29]. Despite the increasing availability of digital resources, many students still rely on textbooks for structured and comprehensive learning, particularly during early stages of their education [50].

As students' progress, their focus shifts toward **research-oriented information needs**. These include accessing peer-reviewed journal articles, systematic reviews, clinical trial data, and experimental findings. Research activities such as project work, dissertations, and thesis writing require students to engage deeply with scholarly literature and develop critical evaluation skills [40,41]. The ability to navigate complex databases and retrieve relevant studies becomes increasingly important at this stage.

In addition to academic and research needs, pharmacy students also have significant **clinical information needs**, especially during internships and clinical rotations. These needs involve accessing up-to-date information on drug interactions, treatment protocols, dosage guidelines, and patient care strategies [38]. Reliable clinical databases and evidence-based resources are essential for supporting safe and effective decision-making in real-world healthcare settings.

Another important dimension is **professional information needs**, which include knowledge about regulatory frameworks, pharmaceutical policies, industry trends, and career opportunities. Students must stay informed about guidelines issued by regulatory authorities and developments within the pharmaceutical industry to prepare for professional practice [35].

Furthermore, **personal and lifelong learning needs** play a crucial role in shaping ISB. Pharmacy students often seek information related to skill development, competitive examinations, and continuing education programs. These needs reflect

the importance of self-directed learning in maintaining professional competence [73].

The diversity of these information needs highlights the necessity for **integrated information systems** that provide access to a wide range of resources. Academic libraries must cater to these varied requirements by offering both traditional and digital resources, as well as training programs to enhance information literacy [44,46].

## SOURCES OF INFORMATION:

Pharmacy students utilize a broad spectrum of information sources, each serving distinct purposes and offering unique advantages and limitations. The choice of sources is influenced by factors such as accessibility, credibility, convenience, and familiarity [9,50].

### 1. Print Sources

Traditional print resources, including textbooks, reference books, and printed journals, continue to play a role in pharmacy education. These sources are often considered reliable and authoritative, particularly for foundational knowledge [50]. Textbooks provide structured content and are widely used for exam preparation and conceptual understanding.

However, print resources have several limitations. They are often **outdated**, lack real-time updates, and are less accessible compared to digital resources. Additionally, physical access to libraries may be restricted by time and location constraints [53].

### 2. Electronic Resources

Electronic resources have become the **primary source of information** for pharmacy students. These include:

- Online databases (e.g., PubMed, Scopus)
- E-journals
- E-books
- Institutional repositories

These resources offer several advantages, including:

- Up-to-date information
- Advanced search capabilities
- Remote access
- Integration with citation tools

Electronic resources support both academic learning and research activities by providing access to peer-reviewed and high-quality content [41,53].

### 3. Internet and Search Engines

General search engines are among the most frequently used tools for information seeking. Their popularity is driven by:

- Ease of use
- Speed
- Accessibility

However, reliance on search engines poses challenges related to **credibility and accuracy**, as not all information available online is reliable [60]. Students often lack the skills to differentiate between authoritative and non-authoritative sources, leading to potential misinformation [23].

### 4. Social and Informal Sources

Pharmacy students frequently rely on **informal sources**, including:

- Peers
- Faculty members
- Discussion groups

These sources provide quick and context-specific information but may lack scientific rigor. Peer interactions, however, play an important role in collaborative learning and knowledge sharing [72].

### 5. Multimedia and Mobile-Based Sources

The increasing use of smartphones has led to the adoption of mobile-based information sources such as:

- Educational apps
- Online video platforms
- Digital learning tools

These sources support **flexible and interactive learning**, catering to diverse learning preferences [64].

## 6. Evaluation of Information Sources

The selection of appropriate information sources requires critical evaluation based on:

- Credibility
- Relevance
- Accuracy
- Currency

Despite the availability of high-quality resources, many students rely on easily accessible sources rather than authoritative ones, highlighting the need for improved information literacy [42].

## INFORMATION SEEKING BEHAVIOR PATTERNS:

Information seeking behavior among pharmacy students is characterized by a combination of structured academic practices and informal digital habits. These patterns reflect both the opportunities and challenges associated with the modern information environment [9,24].

One of the most prominent patterns is the **preference for convenience and speed**. Students often prioritize quick access to information, leading them to rely on general search engines rather than specialized databases [60]. This behavior is influenced by time constraints and the increasing demand for rapid information retrieval.

Another key pattern is the **multi-source approach**, where students consult multiple resources simultaneously. This approach allows for cross-verification of information but can also result in cognitive overload and confusion [25].

The **decline in physical library usage** is another significant trend. With the availability of digital resources, students increasingly prefer remote access, reducing the need for physical library visits [61].

Students also exhibit a **trial-and-error search strategy**, experimenting with different keywords and sources until relevant information is found. While this approach can be effective, it is often inefficient and reflects a lack of formal training in search techniques [22].

Additionally, the use of **collaborative and social learning platforms** has become more prevalent. Students share resources and information through online platforms, contributing to collective knowledge building [72].

These patterns highlight the importance of:

- Structured training programs
- Improved access to quality resources
- Integration of digital tools with academic learning

## SEARCH STRATEGIES AND SKILLS:

Effective information retrieval requires the use of appropriate search strategies and well-developed information literacy skills. Pharmacy students employ a range of techniques, though their proficiency varies significantly [11,41].

### 1. Basic Search Techniques

Most students rely on **simple keyword searches**, often using natural language queries. While this approach is easy to use, it has limitations in terms of precision and relevance [11].

Students also tend to use default search settings, which may not provide optimal results. This highlights the need for training in more advanced techniques.

### 2. Advanced Search Techniques

Advanced search strategies include:

- Boolean operators (AND, OR, NOT)
- Truncation and wildcards
- Phrase searching
- Controlled vocabularies (MeSH terms)

These techniques improve the accuracy and efficiency of information retrieval [41]. However, many students lack awareness and training in their use [43].

### 3. Information Evaluation Skills

Critical evaluation of information is essential for ensuring quality and reliability. Students must assess:

- Author credibility
- Source reliability
- Publication date
- Relevance

However, studies indicate that many students struggle with evaluating information effectively, leading to reliance on less credible sources [23,42].

### 4. Use of Technology in Search Strategies

Technological tools such as AI-based search engines and recommendation systems are increasingly used to enhance information retrieval. These tools provide personalized results and improve efficiency but require careful use to avoid overreliance [63].

### 5. Challenges in Search Skills

Common challenges include:

- Lack of training
- Limited awareness of databases
- Inefficient search strategies

Addressing these challenges requires structured information literacy programs and continuous skill development [44].

### ROLE OF ACADEMIC LIBRARIES:

Academic libraries have undergone a profound transformation in response to the evolving information landscape. Traditionally viewed as repositories of printed materials, modern academic libraries have emerged as dynamic, technology-driven knowledge centers that play a critical role in supporting the information needs of pharmacy students [53,54].

One of the primary functions of academic libraries is to provide access to a wide range of information resources, including subscription-based databases, electronic journals, e-books, and institutional repositories. These resources are essential for supporting academic learning, research activities, and clinical decision-making [50,41]. Libraries act as gateways to high-quality, peer-reviewed information that may not be freely available online.

In addition to resource provision, libraries play a significant role in user education and training. They organize orientation programs, workshops, and seminars aimed at improving students' information literacy skills. These programs cover topics such as database searching, use of Boolean operators, citation management, and plagiarism prevention [44]. Such training is particularly important for pharmacy students, who must navigate complex scientific information.

Academic libraries also offer a range of research support services, including reference assistance, literature search support, systematic review guidance, and access to citation management tools. These services are invaluable for students engaged in research projects, dissertations, and publications [46].

The digital transformation of libraries has significantly enhanced accessibility and convenience. Modern libraries provide remote access to resources, online catalogs, and virtual reference services, allowing students to access information from anywhere at any time [61]. This shift has been particularly important in the context of online and hybrid learning environments.

Furthermore, libraries are increasingly functioning as learning commons, providing collaborative spaces equipped with advanced technologies. These environments support group work, innovation, and interdisciplinary learning, aligning with contemporary educational practices [62].

Despite these advancements, challenges remain. Many students are unaware of the full range of library services, and there is often underutilization of available resources. Addressing this issue requires proactive engagement by libraries,

including outreach programs and integration with academic curricula [61].

### **INFORMATION LITERACY:**

Information literacy is a fundamental competency that enables individuals to effectively locate, evaluate, and use information. In the context of pharmacy education, information literacy is essential for supporting evidence-based practice, research activities, and lifelong learning [42].

Information literacy encompasses several key components, including:

- Identification of information needs
- Efficient searching and retrieval
- Critical evaluation of sources
- Ethical use of information

These skills are crucial for pharmacy students, who must navigate complex scientific literature and apply it in clinical settings [38].

The importance of information literacy is particularly evident in the context of evidence-based medicine (EBM). Pharmacy students must be able to interpret research findings, assess their validity, and apply them to patient care. This requires a high level of proficiency in information literacy [38,39].

Academic libraries play a central role in promoting information literacy through structured training programs and workshops. These programs are designed to equip students with the skills needed to effectively use library resources and digital tools [44].

However, several challenges hinder the development of information literacy. These include lack of curriculum integration, limited student engagement, and variations in skill levels among students [43,74]. Addressing these challenges requires a collaborative approach involving faculty members, librarians, and institutional support.

Integrating information literacy into the curriculum is essential for ensuring that students develop these skills early in their education. This can be achieved

through course assignments, practical exercises, and continuous assessment [42].

### **CHALLENGES AND BARRIERS:**

Despite the availability of advanced information resources, pharmacy students face numerous challenges in effectively seeking and utilizing information. These challenges are multifaceted and can be categorized into cognitive, technical, and institutional barriers [52,23].

One of the most significant challenges is information overload, which refers to the overwhelming volume of available information. Students often struggle to filter relevant information from large datasets, leading to confusion and inefficiency [52].

Another major barrier is the lack of awareness of available resources. Many students are unaware of the databases, journals, and services provided by academic libraries, resulting in underutilization of valuable resources [61].

Poor search skills also hinder effective information retrieval. Students who lack training in advanced search techniques often rely on basic keyword searches, which may not yield optimal results [43].

Access limitations pose another challenge, particularly in institutions with limited subscriptions to academic databases. Paywalls and restricted access can prevent students from obtaining necessary information [56].

Time constraints due to heavy academic workloads further complicate information seeking. Students may prioritize speed over quality, leading to reliance on easily accessible but less credible sources [30].

Technological barriers, such as poor internet connectivity and lack of digital skills, can also affect access to information, particularly in resource-limited settings [64].

Finally, psychological factors, including anxiety, lack of confidence, and fear of complexity, can negatively impact information seeking behavior. These factors highlight the importance of providing

supportive learning environments and training programs [4].

### **IMPACT OF DIGITAL TECHNOLOGY:**

Digital technology has fundamentally transformed the way pharmacy students access and interact with information. The integration of digital tools and platforms has enhanced accessibility, efficiency, and convenience in information seeking [53].

One of the most significant impacts of digital technology is the increased accessibility of information. Students can now access vast amounts of information from anywhere and at any time, using devices such as smartphones, tablets, and laptops [64].

The use of mobile technologies has enabled on-the-go learning, allowing students to quickly retrieve information during lectures, clinical rotations, or independent study sessions. Mobile applications and online platforms provide flexible learning opportunities [64].

Digital databases and electronic resources offer advanced search capabilities, enabling students to retrieve precise and relevant information. These tools are essential for academic and research activities [41].

The emergence of artificial intelligence (AI) has further enhanced information retrieval by providing personalized recommendations and automated summarization of content. AI tools can improve efficiency but require careful use to avoid overreliance [63].

However, digital technology also presents challenges, including:

- Information overload
- Reduced critical thinking
- Dependence on automated systems

Balancing the benefits and limitations of digital technology is essential for optimizing ISB.

### **EMERGING TRENDS:**

Emerging trends in information seeking behavior reflect ongoing changes in technology, education, and scholarly communication.

The open access movement has increased the availability of research articles, reducing barriers to information access [55,56]. However, the rise of predatory journals poses challenges for students in identifying credible sources [58].

Digital libraries continue to evolve, offering integrated platforms that combine multiple resources and services [53].

Personalized information services are becoming more common, providing tailored recommendations based on user behavior [63].

The integration of AI and machine learning is transforming information retrieval, enabling more efficient and targeted searches [63].

Collaborative learning platforms are facilitating knowledge sharing and peer interaction, enhancing the learning experience [72].

### **DISCUSSION:**

The findings of this review highlight the complex and evolving nature of information seeking behavior among pharmacy students. While digital technologies have significantly improved access to information, they have also introduced new challenges related to information overload and skill gaps [52,23].

The reliance on general search engines instead of specialized databases indicates a need for improved training and awareness [60]. Students must be equipped with the skills necessary to effectively navigate complex information systems.

Academic libraries play a crucial role in addressing these challenges by providing access to resources, training programs, and research support services [44,46].

The integration of information literacy into the curriculum is essential for ensuring that students

develop the skills needed to succeed in academic and professional contexts [42].

### RECOMMENDATIONS:

To improve ISB among pharmacy students, the following recommendations are proposed:

- Strengthen information literacy programs [42]
- Integrate ISB training into curricula [44]
- Enhance digital infrastructure [53]
- Promote awareness of library services [61]
- Provide training in advanced search techniques [41]
- Encourage critical evaluation of sources [23]
- Foster collaboration between faculty and librarians [46]

### FUTURE RESEARCH DIRECTIONS:

Future research should focus on:

- AI's impact on ISB [63]
- Comparative studies across disciplines [73]
- Longitudinal analysis of ISB trends
- Evaluation of information literacy programs [42]

### CONCLUSION:

Information seeking behavior is a critical competency for pharmacy students, influencing both academic success and professional development. The transition to digital information environments has transformed how students access and use information [53]. Despite these advancements, challenges such as information overload, lack of search skills, and limited awareness of resources persist [52,23]. Addressing these challenges requires a comprehensive approach involving education, technology, and institutional support. Academic libraries play a central role in this process, providing access to resources, training programs, and research support services [44]. By enhancing information literacy and adopting user-centered approaches.

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