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November 2022

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Akbar, Mirza Muhammad, "Toward a Theoretical Model for Scientific Information Seeking" (2022). *Library Philosophy and Practice (e-journal)*. 7421.

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Toward a Theoretical Model for Scientific Information Seeking

Keywords: Review of literature, Gathering of information, Universities with research faculties

ABSTRACT

According to the literature reviewed in this article, faculty members who are involved in research have a variety of information-seeking behaviours. Scholarly information needs are represented in a new way by a new model. Career advancement, discovery tools, and interpersonal networks all play a role in the model's design. TD Wilson and James Krikelas' theoretical frameworks play a significant role in constructing the model for describing scientific information needs. University administrators and librarians can use this model to help faculty with their information-seeking, research, and teaching endeavors.

Introduction

Scholars' searches for information can be explained by a variety of theories, some of which are explored in this article. Scholars are among the most voracious consumers of information, so it's critical to understand their specific information requirements. Scholarly information seeking is frequently studied using social science methods. Social science scholars' information-seeking habits were identified by Ellis (1989). While Ellis' work provides an excellent description of how scholars search for information, it does not model the factors that influence information-seeking decisions. To get to the bottom of why and how people seek out information, it's necessary to look at both sides of the coin. Customers may benefit from better service if staff members have a deeper understanding of the subject. Instead of focusing on behaviours, I follow T.D. Wilson (1981) stated in this article, who developed a foundation for describing the driving factors that drive information seeking. Scholars, unlike Wilson, have specifics based on the nature of their occupation. Faculty members' informational requirements differ significantly from those of general users, necessitating the development of a new model to account for this. Those working in academic libraries support knowledge creation by faculty, whereas librarians working with students who are merely consuming information have a different focus. Academic librarians can benefit from a model that is specifically tailored to their patrons' needs. Even though this article builds on a variety of information-seeking theories, it has implications for scholars' interactions with information. Personal and career needs; interpersonal factors and effects; and the technological environment for information seeking are three categories of theoretical perspectives that this article examines.

Review of information seeking theories

For the sake of knowing Needs for personal, professional, and environmental well-being As Wilson (1981) puts it: "Information use begins with an information user's desire to acquire knowledge." Formal and informal systems are used by users to search for information and meet their information needs, and either succeed or fail in meeting those needs. The knowledge they gain, if successful, will help them in the future. A new search must be conducted if the first one fails. Many obstacles to information gathering exist according to Wilson's model. They demonstrate the connection between physiological, cognitive, and affective needs and information needs. It's possible that these are personal needs, social role-based needs, or work-related needs. R. Savolainen (2016) has recently expanded Wilson's model will be utilized in its entirety with variables such as types of emotional and cognitive roadblocks that impede information gathering. Emotional barriers include apprehension about Confidence in using information discovery systems is stifled by the fear of admitting your lack of knowledge. An inability to communicate effectively, an inability to locate relevant resources, and a lack of search skills are examples of cognitive variables (R. Savolainen, 2015).

There are many reasons why academics need information: professional advancement, a desire to learn new skills, and a desire to publish academically so they can keep their jobs. It is possible that these requirements do not always coincide. It is possible, for example, that the publications with the highest acceptance rates (such as those with editorial board members who are authors) are the ones that are not critical to the paper's main argument. A few academics believe that citations from journals that require a subscription are more trustworthy than citations from open-access resources. Some research topics may be chosen more for their publication potential, their ease of data collection, or their funding opportunities than for their relevance to the field as a whole. Convenience may be more important than relevance when it comes to selecting the right researcher for the job. Some data sets may be chosen because they are already available rather than because they are the most useful. Additionally, faculty members' individual time constraints have an impact on their data-gathering needs. Because of their extracurricular activities, they are limited in the amount of time they have available for research and reading. Teaching and service are just some of the other responsibilities that academics have in addition to their research. 52 percent of the scholars polled supported the statement: "I shape my research outputs and publication choices to

match the criteria I perceive for success in tenure and promotion processes" (Wolff, Rod, and Schonfeld, 2016). (p.30).

The updated information behaviour model by TD Wilson in 1997 removed barriers and introduced intervening variables, recognizing that some factors encountered during an information search can aid in the pursuit of knowledge rather than impede it. Psychological, demographic, interpersonal, environmental, and source characteristics are now included as intervening variables in his newly revised model. These are just a few examples of the many factors that can interfere with a project's success. There are a number of factors that can act as an intermediary, such as a new coworker with ideas about your research, or the looming deadline for your project (such as conference submission deadlines), establishment of a brand-new professional organization or publication in your field, etc. Using Wilson's model, it is possible for users to engage in passive attention (such as listening to the news without having a specific information goal in mind), passive search (discovering relevant information while conducting another search), active searching, or ongoing searching. Passive attention to scholarship is possible the current information environment is characterized by a lack of privacy thanks to social media sites. Academia.edu, Research Gate, Twitter, and Facebook are just a few of the sites where scholars can keep up with one another's work or specific topics (Chapman & Greenhow, 2019). There is also the concept of risk and reward in Wilson's model (as the benefits of conducting more searches decline, so does the amount of time spent searching). Emotional, physical, social, and economic risks and rewards are all involved in information-gathering.

Prior knowledge is required

Previous experience has provided knowledge. In the words of Brenda Dervin, people's information-seeking behaviour is influenced by their current situation. Information-seeking behaviour can be both internal and external, according to Dervin's (1998) theory of meaning-making. Prior knowledge and current circumstances influence users' information needs. They use information gathering and interpretation to fill in knowledge gaps when they arise. The way they approach a subject determines how they perceive it. As a result of Dervin's theory, information seekers must consider the context of time and space when searching for data. It is common for research based on information seeking theories, like Chatman's, to focus on information seeking contexts (R. Savolainen, 2009). Depending on the circumstances or stage of life, a person may approach a subject in a different way. Users' personal and professional needs change over time, as

do the events in their personal and professional lives. If you are a scholar, this means that the way you look for information is different at the beginning of your career when you are a doctoral student and working as an assistant professor than when you are a tenured professor. For the sake of furthering their own and the field's knowledge, they are working to fill in the many holes in the existing scholarly literature.

Orientation toward help seeking

There are three types of sources: internal, interpersonal, and impersonal. According to Krikelas (1983), the mind of the user is the primary source of information. A user's past experiences and creative thinking are brought to bear on the issues. As a result, when this fails to solve a problem, users turn to the outside world for help. In the beginning, they look to those closest to them, then to experts in the field, and finally, to relevant literature. Krikelas believes that information seeking and information giving are inseparable. A scholar's ability to critically examine his or her own work can be sharpened by providing assistance to his or her peers. Despite the library's reputation as a place of impersonal rather than interpersonal information, Krikelas hypothesized that people tend to avoid librarians when they visit. According to Krikelas and others, scholars prefer to seek information from people rather than literature because they are used to devoting extended periods of time to literature and see literature as an extension of the thinkers who create it (Fitzgerald, 2018).

Scholars' interactions with one another have evolved in the digital age. Researchers spent more time in libraries before the digital revolution, allowing them to make more connections. There has been a shift in academic communities at the faculty level since libraries have become less common gathering places for academics. Discipline-specific meetings are held every year. On the internet, they communicate with or monitor one another. Serendipitous meetings with scholars from fields other than one's own or from outside of academia are becoming less common. As a result, interdisciplinarity has become increasingly important in academics in recent years. Additionally, the increasing demands for interdisciplinarity have prompted scholars to use general rather than specialized search engines for their respective fields (Jamali & Nicholas, 2010).

Avoidance of new information

Emotional aspects of information-seeking were studied by Elfreda Chatman. As a way to explain why people tend to put their faith in those who are similar to them, there are insiders and outsiders, according to E.A. Chatman (1996), who coined the term. She argues that social groups prefer to keep themselves to themselves and thus miss out on valuable information from other groups. Acknowledging one's wants and needs is an effective way to avoid becoming overburdened or indebted to one's colleagues. Often, people avoid seeking help because they believe that those who have the power to help aren't really interested in helping. Refusing to seek help is a protective measure, but it can have unintended consequences. In the eyes of their peers, information avoiders may still be perceived as weak because they failed to complete a task and did not seek help from their supervisors, despite their inability to succeed. As Chatman points out, people may avoid seeking help if it is not accepted as a social norm. Because of their relationship with the other person, a person may not feel comfortable asking for help from someone who can provide it. Insiders and outsiders can be created in academic silos. If you're a well-known scholar and you need help from a newbie, you might feel awkward about it. As a result, rather than asking to be taught new skills, academics may prefer to have someone else do the work for them. According to some critics, the author of Chatman's work fails to address the emotional impact that discrimination People's information-gathering habits are affected by their race, sexuality, and gender identity (Cooke, Miksa, Mehra, & Gray, 2019). Researchers, particularly those from more privileged social strata, may be discouraged from seeking assistance if they have had prior encounters with discrimination.

Alienation theory was applied to information seeking by E.A. Chatman (1990). She said in her speech people from discussing their informational requirements because of competition and distrust. A group of impoverished people was the primary audience for this researcher's work. Chatman, however that information poverty is not always linked to financial poverty. So, we can see that even the most accomplished academics may avoid asking for help on occasion. If you're a well-educated person, you might think you don't need help. Rather than appear gullible, they can go around directly asking for assistance. They may also believe that no one can assist them due to the specialized nature of their subject. To protect their ideas before they are published, they may be reluctant to consult a lawyer for advice. A workaround for this problem has been found in some fields by posting their ideas online before they are published.

They may be a special case of susceptible avoidance of information among minority scholars who are becoming more accepted in academia and who we must work to retain (Settles, Buchanan, & Dotson, 2019).

A lack of social connections keeps the poor from having easy access to some media. Because of this, she argues, people in low-income areas are more selective about the type of assistance they ask for. Furthermore, scholars are constrained by the social and financial resources they have at their disposal to pursue certain types of information over others. As a result of their proximity to one another and the fact that they share a common field of study, likely sources of information are other academics working in the same field, which makes them likely sources of assistance for academics. If you want a different perspective, you may have a hard time getting in touch with people outside your field of expertise. "Small world" of information theory has been employed by Huotari and Chatman (2001) to describe organizational behaviour. Knowing what to look for, how to ask the right questions, and where to look for the answers in academic institutions is critical. Software for data analysis, expertise in data analysis techniques, availability of research subjects or funding. Some of the possible advantages of working with a fellow researcher include the ability to get in touch with policymakers and practitioners capable of putting research findings into action. Help from practitioners and policymakers could solve problems by providing information and obtaining financial resources as well as participants and the ability to have a greater impact on research. Using the services of a librarian can also have its benefits. inexperience with the full spectrum of available tools new methods may be difficult for researchers who have been working in the field for a long period of time. These students may not be aware of the resources available to them at their current school, if they received their education elsewhere or in a different country. You may also find out about these resources from a fellow professional in your field.

Information-gathering instruments

The impact of tools on society

In this section, I'll talk about how people search for information in a technological environment. He wrote "activity theory" of learning in the context of education in the 1920s by Russian psychologist Lev Vygotsky. According to him, access to information is a function of the means by which people gain access to it (Nardi, 1996). It's all about the artefacts and devices they use, as well as their plans and ideas. Learning is influenced by the language and symbols that are used. Their information behaviour is also influenced by the rules and conventions that govern the

systems they use. Because of the constant evolution of information retrieval methods and tools, Vygotsky's theory still holds true in the digital age. The zone of proximal development was also introduced by Vygotsky (1978). Learners' ability to learn on their own and with guidance can be distinguished by this zone. One of the most important aspects of this topic is whether or not scholars learn about new ideas from fellow researchers or attend conferences. On the topic of Vygotsky's theory of information seeking, see Wilson's work from 2008.

What a scholar finds depends on how they conduct their search. According to a study of researchers' e-journal usage, researchers can now find articles they wouldn't have otherwise by using keywords to narrow their search results. However, if a scholar search using keywords, he or she may miss out on a wide range of literature because keywords exclude synonyms, unless he or she uses controlled vocabulary systems that link synonyms together. By excluding topics with similar names but different meanings, a controlled vocabulary can help you focus your search results. Due to the lack of subject heading search options, using Google Scholar as a primary information source is problematic.

Scholars' search results are influenced by the use of a particular search engine. Some search engines, such as Google, allow you to search for using past browsing history to tailor results, while others don't. The number of citations, date published, and name of author for an article are all taken into consideration by Google Scholar when determining the order of results (as of this writing, Nentwich & Konig (2012) is the most recent edition). This is a problem because a high-profile journal or author isn't always a sign of a high-quality article. The Matthew effect can influence reviewers and readers, despite the fact that prestigious citations can (Merton, 1968) be perpetuated, which boosts well-known by-the-by articles that focus on obscure ones as a result. When researchers search for literature, they are influenced by the language they use. Citations from other fields may be more frequently cited if general search tools like Google Scholar are used instead of specialized databases. Scholars can find citations that will be familiar to their reviewers and readers by using tools and terms from their own field as well as broader tools that may provide sources from outside their own field.

Access to scholarship in library databases is similarly restricted to that available on Google Scholar. Only peer-reviewed publications are often included in their databases. There is no guarantee that the most relevant articles on a given topic will be found in peer-reviewed journals, which are used to determine academic tenure and promotion. Other publications may publish

articles that do not adhere as strictly to established conventions as scholarly journals do. While some databases include all publications, others don't. Scholars should be aware of the implications of their decisions to use specific databases over others. Restrictions on database access allow researchers to narrow their search by selecting the age, discipline, and whether it's a publication or a piece of literature they are interested in. However, these restrictions can also prevent researchers from discovering new literature drawn from a variety of academic fields and media. Through serendipity, new connections can be discovered and new perspectives can be gained.

Diffusion theory

Scholars' use of information-gathering tools is influenced by how widely those tools have been adopted. There are five key factors to consider when it comes to determining how quickly an innovation becomes popular among members of the same society, according to Rogers (2003): 1) its relative advantage (premierity; a combination of cost, convenience, and satisfaction); 2) its compatibility with user needs and values; 3) its complication; and finally, 4) its "trialability" and visibility to the public. In some cases, convenience is more important than thoroughness, and additional needs necessitate the inconvenience of scholars. Journal articles are preferred by faculty members according to Zoellner, Hines, Keenan, and Samson (2015) because of the ease with which they can access journal articles through library databases. In order to save time, it is possible that more relevant information is overlooked. There are a variety of resources available to researchers, including one another, their students, the library website, and even their own librarians. The amount of time a scholar has spent in an online environment can have an effect on how comfortable they are using a particular online tool. Three-quarters of the education professors surveyed by Rupp-Serrano and Robbins (2013) felt discouraged from using electronic library services because they were unaware of the resources available.

The minimization of work

It is stated in Zipf's Principle of Least Effort that people will do the smallest amount of work possible. They do their best to find the information they need by minimizing the effort they have to put into the search (Case, 2002). When in doubt, ask someone you know or go to a trusted source you trust instead of going to the best source of information. They're always looking for ways to make the process of finding new literature as efficient as possible. According to Zipf's theory, the more a source is used, the lower its use rank becomes. The most frequently used source in a library consumes twice as much as the second most frequently used source and three times as much as the

third most frequently used source. Some authors' work is more recognizable than others. Lotka's Law, which states that the number of authors who produce X publications is approximately $1/X^a$, can be used to explain this phenomenon. Fewer authors produce more books than authors who produce a lot of books. Like Merton's (1968) Matthew Effect, where famous authors are cited more frequently than lesser-known authors, this is a similar phenomenon. The funding and research assistants available to well-known authors are of higher quality.

It's not just authors who suffer from the Matthew Effect. According to Bradford, a journal's article distribution can be described using the formula $1: n: n^2$ (1976). There may be 200 articles relevant to one topic in five core journals, but there may be an additional 200 articles relevant to the same topic in 25 open access journals not core to the topic (52). Examining even more journals yields decreasingly valuable results. Many more information sources are available to researchers in today's digital information environment. On the other hand, only a small amount of data is available to scholars. During the course of a survey conducted by Rupp-Serrano and Robbins (2013), they discovered that 42% said that time constraints kept them from taking advantage of electronic library resources. For this reason, articles in major publications are read more frequently than articles published by smaller publications. Work done in the margins of a field has the potential to introduce fresh viewpoints.

It's possible to focus on a small number of resources while overlooking a large number of resources, depending on the abundance of resources. Pirolli (2007) first proposed the concept of "Information Foraging." According to this theory, users of information seek to maximize the amount of knowledge they gain from their interactions with information. A comparison is made between animal foraging and human information-gathering. The term "in-formavores," coined by George A. Miller, is used in the theory. To find out how much information a source has to offer, people who use the information foraging model look for cues from the source itself. A perfumer by trade, Pirolli has coined the term "information scent." As a result, users are less likely to stick around on a single website if they are lured away from it by the allure of information in other places. Researchers in the future, they may spend less time with their sources if they are immersed in a sea of information.

The ultimate goal of scholarly research is to contribute to the body of knowledge. This creates a wide range of challenging information-gathering tasks. According to Byström and Järvelin (1995), the more difficult it is to acquire the information needed to do so, to gather data, they used a

combination of general habit questionnaires and participant diaries. There are many levels of information gathering required for tasks that are more complex. According to the researchers, most complex tasks require that the user find out where to look for the information he or she needs, then go to those places. Simply using familiar resources can help with simple tasks. Complicated tasks necessitate more resources than simple ones. More often than not, simple tasks lead to successful searches. It may be necessary for scholars to use time-consuming search techniques in order to locate new sources of knowledge if they are to produce groundbreaking research. To compound the problem, scholars face an ever-increasing demand for peer review and an ever-growing volume of scholarly literature to keep up with as well as an ever-increasing new technology to learn as part of their research and teaching efforts.

A framework for scholarly research

It is concluded from the theories in this article that scholars face multiple cognitive and emotional needs as they search for information. Consider the values of your academic disciplines and your desire for professional advancement in order to meet these demands. The potential of your field to advance is also a consideration. Scholars' reliance on searching and seeking assistance is on the rise due to the growing problem of information overload. Some academics may be able to devote some time to keeping tabs on developments in the field. Despite the ideal of a comprehensive review of the literature, the diminishing returns of further research often force scholars to set a limit. Additionally, the tools available for searching and the level of familiarity with these tools can limit the scope of a search and the willingness of scholars to ask for assistance with such tools, etc. Students' confidence and social networks have an impact on their willingness to seek help. There are many factors that contribute to an academic's confidence when it comes to an information-gathering task. Confidence can influence a student's level of ambition and whether or not they seek help. Additionally, it could influence whether they ask for assistance as instruction or for assistance in the form of having someone else do the work for them. Figure 1 shows how the in-formation behavior theory affects how researchers seek out information.

The three sets of factors depicted in the figure influence information-seeking strategies: a scholar's motivation to seek help from others, their field's influence on what work is rewarded, and the tools available for information gathering. Research is influenced by three types of factors: field factors (red), interpersonal and emotional (yellow), and information-gathering resources (green). To help

researchers better understand what are the academics' options, tools, and strategies are most likely to enthusiastically adopt, this model can serve as a useful guide.

A model's variables appear to be distinct, but in the information-seeking process, they merge and overlap. Each shape is shown with a dashed outline rather than a solid one. Confidence, opportunities for advancement in one's career, and information discovery tools are all influenced by one's social network. The time it takes to learn a discipline can reduce the time available to learn about discovery-related tools. It is also possible to learn more about available discovery tools by studying an information-related field of study. Scholarly confidence can be boosted by deepening one's understanding of one's field of study. Confidence can lead to a greater number of contacts and a better chance of securing research funding.

In order to advance the field, one must devote time and effort to filling knowledge gaps in the academic literature. In the words of Dervin, information needs change over time and in different contexts. This factor enhances librarian-faculty involvement and emphasises the significance of being aware of current and future research trends for librarians. It is also possible to talk about the "knowledge of the individual" in terms of the individual's totality. As a result, scholars who are well-versed in a particular subfield or method, as well as a theoretical framework, tend to draw on one another's work in order to advance their understanding. The goal of this project is to provide scholars with both well-known and novel sources of information and connections. Libraries can help make this process run more smoothly. In terms of Wilson's theory of diverging and converging needs, "opportunities for career advancement" are relevant. A librarian's role in faculty development is to keep this in mind when planning programmes and inviting guest speakers. Other topics, such as improving your work-life balance, can help you impress tenure and promotion committees.

When it comes to Chatman's concept of "in-formation avoidance," "confidence/affective state" ties in. Students and junior faculty who have strong mentors and strong support networks for career questions and emotional support will have more resources to draw from in the future. These relationships can be cultivated by librarians who want to help current and future faculty members. As a result, scholars who are dealing with difficulties in their work will be more able to cope and persevere. Special consideration may be given to scholars who are working on understudied

subjects and those who are in the midst of a stressful period in their professional development. Library staff can help spread information about new tools and methods for finding information via personal connections.

As a result of Vygotsky's theory of education, I added the variables "available tools for information seeking" and "knowledge of information seeking tools" to the model. The librarian's job is to help current and future faculty members with information-gathering resources in their field and to teach new scholars about resources they may not be familiar with. Those researchers who are branching out into new fields or methods may require some extra help getting used to the tools they haven't used before. "Time and Budgetary Variables" are included. Wilson's time constraints and Zipf's minimum effort are taken into account in the model. Library staff should take into account the time constraints of faculty when planning new resource connections.

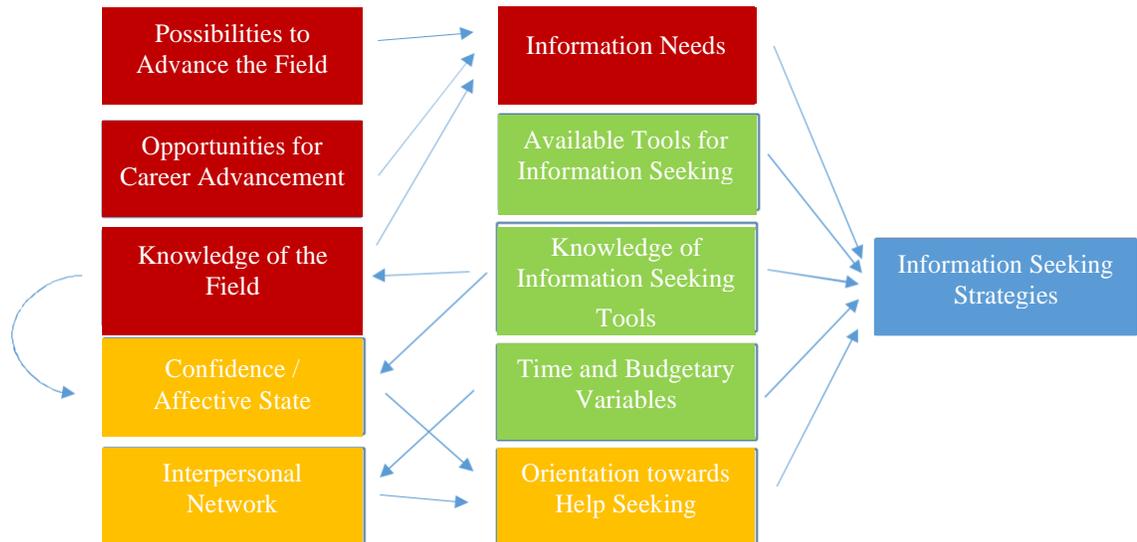


Fig. 1. Factors that affect researchers' methods for finding information.

Conclusion

With this model, new scholarly information products can be developed and marketed. With the many demands on academics' time and emotional state, librarians must keep in mind the importance of building personal connections in their outreach efforts. We must keep in mind the aspirations and training requirements of junior faculty members who are working toward tenure. Doctoral students should be taught by teachers, faculty advisors, and librarians to keep this model in mind. Think about how the requirements you set for tenure and promotion will influence faculty motivation to choose research topics of value to their fields, delegate research tasks appropriately, and keep yourself thoroughly up-to-date with knowledge in your fields. The model's approach emphasises the freedom of faculty members to pursue research questions that they may only be able to investigate if they have a secure job. This research could benefit from further investigation into the role of affective and cognitive information-seeking variables among researchers.

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