**Academic Information Behavior
and the Role of the Academic Library:
A Study of an Israeli University**

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A library could show you everything if you knew where to look.

Pat Conroy, *My Reading Life*

Abstract

This article-based dissertation presents three articles, all studying information behavior of the patrons in an academic library in Israel. The first article, "Information needs of students in Israel — A case study of a multicultural society" was published in March 2014, in the *Journal of Academic Librarianship*. The second article, "Ask a librarian: Comparing virtual reference services in an Israeli academic library" was published in April 2015, in *Library & Information Science Research*. The third article, "Library metrics; studying academic users' information retrieval behavior: A case study of an Israeli university library", was accepted in October 2015 to the *Journal of Librarianship & Information Science*. The purpose of this dissertation is to get insights on library users' academic information behavior and information needs from multiple aspects.

The three articles cover the research questions posed in the dissertation proposal. All three articles studied information behavior of the University of Haifa library's (the Younes and Soraya Nazarian Library) patrons, my workplace. The research comprises the student's perceptions and the mediation that library patrons ask for—as reflected in the virtual reference services, in the patrons' information retrieval behavior, and in log files' analysis from the library's information systems.

For the first article, we used an information behavior questionnaire. The goal of the study was to describe how Israeli students conduct research and find information. We also tried to understand how students from different native language groups from varied cultures and backgrounds seek information. We surveyed 151 students from four faculties. The study yielded very similar results to other international studies, although in our research we observed some differences due to multicultural characteristics of the Israelis' students. When searching for information for an academic assignment, the students indicated the Internet (search engines and Google Scholar) as their primary source of search. There was a statistically significant difference in using search engines for retrieving academic information between the Hebrew and the Russian language groups, who preferred search engines, and the Arab language group, who preferred library resources. Another interesting finding emerging from the data was the significant differences in the usage of the "Ask a librarian" section. Both the Hebrew

and the Russian language groups hardly use the service. In contrast, the Arab language group frequently used it.

For the second article we analyzed two web-based virtual reference services (VRS)—chat (116 interactions) and email (213 exchanges)—at an academic library. The study combined the findings with an open-ended questionnaire, administered to the library's reference team (n=16). The contents of a set of questions and answers in both VR services were analyzed. The VRS data were collected and coded, including patron affiliation (only for email sessions). The patrons' questions and the librarians' answers were analyzed. Each reference interaction was classified according to *who* was using the service, *what* the patrons were asking, and *how* the questions were answered. The library's reference staff questionnaire comprised eight questions regarding VR services in comparison to reference. One of the major findings of the study was that the chat VR service does not satisfy the library users' information needs. In the email VRS most questions were *in-depth questions*. Most answers were bibliography lists sent to the patrons. In the chat VRS, most questions were classified as *short questions*. Most frequently the questions were not answered immediately but were forwarded to another service. A group of the library's reference staff responded to eight questions presented to them. When asked about the difference between the VR to FtF (face to face) reference interactions, most answers indicated that the physical FtF at the reference desk was more personalized and customized to the users' information needs.

The third article presented an analysis of data from log files of library patrons' information access, from the library's open URL link resolver service, the library's home page, and the publishers' records of downloads accessed through the library's subscriptions. All data were collected in order to study library patrons' information access and retrieval behavior. Data were provided for the period between January 2011 and June 2014, of which 18 months were selected and analyzed. The use of the recommended resources service (a system that harvests metadata from the open URL link resolver usage log files and offers the user similar sources accordingly), is relatively low in comparison to full text requests from the open URL link resolver in the same period. Library patrons seemingly focus on the links to the full text available online and overlook links to additional options like the recommended resources function. On average (for the 18 months in the sample) the publishers' count of full text

downloads was 3.15 times more than library discovery tool full text requests. From the data it appears that the library's discovery tool is not the major source for accessing full text items and the patrons often prefer other sources such as Google Scholar. Further and detailed analysis of the full text requests registered from the library discovery tool indicates an increase in use over time, as a mean of full text access and retrieval.

In this dissertation we referred to each research question separately, in view of our findings. In addressing the first research question—what are the library patron's information behaviors—we found that the majority of the students use Internet search engines to fulfill their academic information needs. They find library sources trustworthy but difficult to use. Library patrons use Google Scholar, while taking advantage of its ability to connect to library subscriptions. Using library subscriptions indicate the important role of the academic library as the provider of the information sources, regardless of where the user discovered and retrieved them. Google Scholar may not bring users physically to the library, but it can link users with resources provided by the library.

The second research question addressed Israeli students' information needs and information behavior in searching information for an academic assignment. The findings show that their information behavior is similar to students in other parts of the world. The study did point out some significant differences between the three native language groups tested (Hebrew, Arabic, and Russian), in response to several questions regarding their preferred method of information retrieval, using search engines to find academic information and the use of library services.

The third research question was meant to study how the libraries' virtual reference services fulfill the patron's information needs. We found differences between chat and email virtual reference services. Email was found to be an effective means of satisfying users' information needs while the chat virtual reference service did not fulfil their information needs. Face-to-face (FtF) reference interaction was found as the preferred reference service by librarians even though they believed that the best reference service depended on the users and their information needs.

Introduction

This dissertation intends to help academic libraries understand their patrons' information behavior in the second decade of the 21st century and to make library services more available and beneficial to its users. The study presents a unique perspective on library users' academic information behavior from three different aspects. The users', the librarians and systems log files. The study utilizes different methodologies and different research populations to get full and comprehensive insights. We believe that an attempt to understand information behavior will contribute to the Library and Information Science (LIS) research and practice, and to libraries' role in promoting study, teaching, and research in academic environments. The study employs several methods to explore information behavior: a survey of student's information needs, content analysis of virtual reference interactions, and library information systems' log analyses.

As academic libraries become fully immersed in the 21st century, they are beginning to realize that to best meet users' needs, they must first look at user information behavior and information preferences. As online information resources proliferate, students are making fewer visits to the campus library to retrieve information. Students turn to a variety of sources for information when completing academic work and they increasingly rely on the Internet as their primary information source. The students using the library attempt to minimize the overall work associated with their information needs. The academic libraries of the 21st century are able to take advantage of the Internet and to make information more available to their users. To meet the information needs of their patrons, the libraries need to utilize a diversity of online, accessible, and easy to use services.

This article-based dissertation comprises three articles. All studies were conducted by me under the supervision of my dissertation advisor, Judit Bar-Ilan, and were written by me, with guidance from her. The library, which served as the data source for all three studies is the University of Haifa library (the Younes and Soraya Nazarian Library), my workplace for the last 20 years. I selected this research setting because it reflects and represents an academic library in Israel and enabled me to study information behavior from different angles. The library is a central library, which serves population of 18,000 students (1200 of them are PhD students). It has 16,000 sq. m. facility and

2.5 million print and electronic items. The University of Haifa holds seven faculties and is unique in its cultural composition. The university holds the largest number of military and security personnel who acquire their education alongside Jewish, Haredi and secular students, new immigrants, Arabs and Druze. The University of Haifa is the most pluralistic university in Israel.

The first article "Information needs of students in Israel — A case study of a multicultural society" (Greenberg & Bar-Ilan, 2014) was published in the *Journal of Academic Librarianship* and surveyed students' information needs and information behavior while they conducted an academic assignment. The study focused on the different phases of their work, their search process, their preferred information sources, and the factors affecting their source selection. The study also analyzed their use of the library services and found multicultural differences among the various ethnic groups.

While the first article addressed the student's information behavior, the second studied the mediation they and the other patrons of the library seek when using virtual reference services. The second article "Ask a librarian: Comparing virtual reference services in an Israeli academic library" (Greenberg & Bar-Ilan, 2015) was published in *Library & Information Science Research*. This article analyzed two web-based virtual reference services (VRS) and compared the questions and answers in both. In addition, the study surveyed the librarians' perspectives and preferences regarding reference services. One of the major findings of the study was that the chat VR service does not satisfy the library users' information needs and the reference librarians indicated that the physical FtF sessions at the reference desk were more personalized and customized to the users' information needs. The third article examined another aspect of information behavior. This article studied information retrieval behavior, as reflected by log files of the library's information systems. It is titled "Library metrics; studying academic users' information retrieval behavior: A case study of an Israeli university library" (Greenberg & Bar-Ilan) and was accepted to the *Journal of Librarianship & Information Science*. This study analyzes data from log files on information access behavior from the library's open URL link resolver service, the library's home page, and the publishers' records of downloads accessed through the library's subscriptions. From the data it appears that, the library is not the major source for accessing full text items and the patrons often prefer other sources such as Google Scholar.

This article-based dissertation is divided into four parts as required by the School of Graduate Studies. In the first part I present the motivation behind the dissertation and a review of related works in various aspects of the study. The second part describes the methodologies applied in the studies. The third part is the articles, followed by the discussion and conclusion in the fourth part.

The first section of the review includes definitions of the term "information behavior", how the LIS (Library and Information Science) research field refers to the study of information behavior, and what the library's role is, according to LIS literature. This research studied information behavior of Israeli students, so I needed to understand their attitudes and behaviors. Therefore, the second section of the review focuses on the academic library users. Since the majority of the library users are "digital native" students, we addressed their characteristics, search preferences, and information behavior. With Israel being a multicultural society we also reviewed the literature on students' information behavior in multicultural societies and specifically addressed Israeli studies. Our study required us to understand the information seeking behavior of the library users. What is the preferred search environment, how are searches conducted, and why—this was the third section of the literature review. As stated earlier, our main concern is the academic library, thus the fourth section of the review presents the subject of academic libraries and their services. We elaborated on the subject of reference services, since we examined the virtual reference services in our study. We mention the evolution of the virtual reference services and some studies on its use and guidelines. We also refer to the changes in the search interfaces to library resources with a review on the current federated search products. Since our findings indicated heavy use of the Google Scholar interface by library patrons, we concluded our review with the ambivalent relationship of the library and Google search engines.

The second part presents the methodology used in all three articles. We review the research methods, discussing each one separately, and present how they answer our research questions.

The third part comprises the pre-prints of the three articles. The first article, "Information needs of students in Israel — A case study of a multicultural society" (Greenberg & Bar-Ilan, 2014), was published in the *Journal of Academic Librarianship*; the second, "Ask a librarian: Comparing virtual reference services in an

Israeli academic library" (Greenberg & Bar-Ilan, 2015), was published in *Library and Information Science Research*; and the third, "Library metrics; studying academic users' information retrieval behavior: A case study of an Israeli university library" (Greenberg & Bar-Ilan), was accepted to the *Journal of Librarianship & Information Science*.

The data source for the first study was a survey conducted at the University of Haifa. For the other two studies we used data from the University of Haifa's (Younes and Soraya Nazarian library) library information systems.

The fourth part contains the discussion of the overall results, the limitations, directions for future research and conclusions.

Literature review

We live in an exciting era of digital transition. The increasing quantity of information, the conversion from print to digital, emergence of new technologies, and the Internet make information accessible anywhere, anytime. This era shapes the patrons of academic libraries' information behavior and challenges the libraries to update and adjust the library services. With the proliferation of the Internet and availability of information, users are making fewer visits to the campus library to retrieve information. Academic libraries need to change their perception that they serve as the main repositories for printed and other academic information material and as the first choice for research information seeking.

The study was motivated as an attempt to understand academic library patrons' information behavior and to promote library's role in the academic environments. I have reviewed the information behavior of library users, addressing specifically to the digital natives information consumption. I referred to the Israeli students as a reflection of a multicultural society with its unique information needs. From the library point of view, I have reviewed the change in libraries services, the information search in the library and its relations to Google interface and search services.

Patrons' information behavior should be investigated in order to identify the role of the library in their academic life. This study addresses multiple components of the academic information behavior:

- The students' perspectives and perceptions on information sources, means of access, search environments, and use of the library.
- The library's perspective on mediation needed by the users when they are conducting research or working on an academic assignment, as reflected in content analyses of virtual reference services.
- The usage perspective, as reflected in data from log analyses of the library information systems.

In this literature review, first we discuss the concept of information behavior as perceived in Library and Information Science (LIS).

Information behavior

There are numerous definitions of the term "information behavior". For this research, we chose to refer to Wilson's (2000) definition as appears in his work on human information behavior:

"Information behavior is the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use" (p. 49).

Wilson also defines *information seeking behavior* as a process resulting from a need to satisfy some goal. In the course of seeking, the individual may interact with information systems such as the library or the web.

In his book "Looking for information: A survey of research on information seeking, needs and behavior", Case (2012) defines "*information behavior*" as a holistic field of research covering information need, seeking practices;

"Information need" is recognition that your knowledge is inadequate to satisfy a goal that you have.

"Information seeking" is a conscious effort to acquire information to respond to a need or gap in your knowledge.

"Information practices"—a term more popular in Europe and Canada—may be considered a synonym for information behavior (p. 5).

In their book "Theories of Information Behavior", Fisher, Erdelez, and McKechnie (2005) conceptualize the term "information behavior" as "how people need, seek, manage, give and use information in different contexts" (p. xix).

Another important term for this study is "information access behavior". We refer to it as the preferred mode of communication to deliver the content from source to receiver. This preference emerges from previous experience of the user and the time taken to receive the information (Agarwal, 2011). "Information retrieval behavior" is the last defined term in our review. The term refers to the search techniques and modifications of search results done by the users to receive the most suitable information sources for their need (Malliari, Korobili, & Zapounidou, 2011).

Seeking and using information are common and essential human behaviors. Checking the weather conditions, finding travel schedules, shopping, ordering theater tickets, and checking the latest news are all examples of information behavior. It includes needing, finding, choosing, and using information. The nature of this research field has changed

from focusing on the information sources (like books, journals and even libraries) and how they are used, to focusing on the individual users' orientation in the search environment, on their needs, their sources of information, and how they retrieve it. Before the World Wide Web, the information seekers needed to use several information sources in different locations to fulfil their information needs. Now it is possible to fulfill them all, using a browser and a search engine. Some of the information channels have merged to one virtual (enormous) channel.

Initially, LIS studied information behavior from a source-centered approach. This has changed and in the 1990s the user-centered approach was introduced. Several researchers led to that change, among them Ellis, Dervin, Kuhlthau, and Wilson (Dervin and Nilan, 1986; Ellis, 1993; Ellis, Wilson, Ford, Foster, Lam, Burton, & Spink, 2002; Kuhlthau, 1988). Dervin and Nilan (1986) also thought that the need to focus on users themselves, will lead to a more efficient and effective service. In their information seeking models, the term "information seeking" is described as a behavior. It includes questions and answers, dialogues and social cognitive and affective components; associated to the user's interaction with an information retrieval system. While some researchers use the term "information behavior" to describe the search activity, the majority of the literature follows Wilson's model (as mentioned here above).

Some of the information seeking models depicts the library, library's means of access, and librarians as a part of a complex information environment (Rozaklis, 2012). Taylor's (1968) model presented self-help and mediated help as two separate functions of special libraries. In his model, an information seeker's first decision is between consulting personal files and asking a colleague. Only the minority of the information seekers will visit a library, and of those information seekers, fewer will consult a librarian. Krikelas' (1983) information seeking model is applicable to a range of information seekers in diverse contexts. Unlike Taylor, he refers to the library as an institute and does not limit the model to special libraries. Krikelas includes a variety of information sources and means of access. The library in his model is considered a formal information source, unlike informal sources such as personal memory, colleagues from work, or personal friends. Abels' (2004) information seeking model includes the use of the web as the main information source (for graduate students). Her model specifies the library and the librarian as part of the means of interaction for the

information seeker. In all these models, the library and the librarian are not considered amongst the first choices of the information seeking process.

Information behavior has changed rapidly and the libraries should study their users' needs and preferences to be a part of the information seeking behavior of the digital natives' patrons.

Academic library patrons: the digital natives

In this work we study the information behavior of academic library patrons in Israel. We characterized this population based on data from the Israel Central Bureau of Statistics, Statistical Abstract of Israel (2010). According to the data, most students are from the age group defined in the literature as the "digital natives".

The Oxford Dictionaries site defines digital native as "a person born or brought up during the age of digital technology and so familiar with computers and the Internet from an early age" (Digital native, n.d.).

The digital natives, also known as the Net generation, screenagers, millennials, or the digital generation (Connaway, Radford & Williams, 2009), tend to be results-oriented and practical when looking for information. Millennials feel at home in virtual environments and expect easy access to full-text documents (Radford & Connaway, 2007). They become impatient with complex searching that yields citations or abstracts and are looking for full gratification of their information requests on the spot. They are used to turning to the web for help, so Google and Wikipedia have become familiar and trusted resources for information queries for them. Net generation students comprise the largest cohort of today's academic library users and pose a special challenge for information service development (Connaway, Radford, & Williams, 2009).

In studies of young people's search preferences, researchers found some consistent themes (Rowlands, Nicholas, Williams, Huntington, & Fieldhouse, 2008; Williams & Rowlands, 2007):

The information literacy of young people has not improved with the widening access to technology.

Internet research shows that the speed of young people's web searching means that little time is spent on evaluating information for relevance, accuracy, or

authority. When faced with a long list of search hits, they find it difficult to assess and rank the results.

Young people find it difficult to develop effective search strategies.

As a result, they exhibit a strong preference for expressing themselves in natural language rather than analyzing which key words might be more effective.

According to PEW Internet and American Life Project report (Zickuhr, 2010), millennials usually prefer to access the Internet wirelessly with a laptop or mobile phone. They go online for news, email, and information searches. Search engine results influence what information they consume. To most digital natives, research of any sort means "Google search" (Palfrey & Gasser, 2013). The PEW Internet and American Life Project Report on the public library habits of Americans under 30 (Peet, 2014) found that the majority of young population (98%) believe that the Internet makes it much easier to find information; yet at the same time only 57% of those surveyed believed it is easy to differentiate between a "good" and a "bad" information source. The report notes that only 36% of the millennials surveyed had used a library web site in the past year, and a mere 19% felt aware of library services.

Digital native students may have the least training with traditional library resources (Purcell, 2012), but their strengths lie in the adoption of technology, online resources, and virtual communications, which are all key elements of the modern academic library.

In our study we specifically addressed Israeli students' information behavior. Since Israel is a multicultural society we also reviewed the literature on students' information behavior in multicultural societies and specifically addressed Israeli studies.

Students in a multicultural society

Israeli students come from a multicultural society; as such, they have special characteristics. Multiculturalism is defined as "relating to or containing several cultural or ethnic groups within a society" (Multiculturalism, n.d.). In our survey, we refer to students coming from diverse cultures and linguistic backgrounds as "multicultural society students". In Israel there are several major ethnic groups, including Israeli-born Jews, Israeli-born Arabs, and immigrants. The literature makes some reference to these students but only rarely in the context of academic assignment behavior and information needs. Most of the studies refer to specially customized library services or

to technical systems relating to multilingual search and retrieval (Caidi, Allard, & Quirke, 2010; Hughes, 2010; Notess, 2008). One can also refer to international students and immigrant students as multicultural society students. Most of the studies (Liao, Finn, & Lu, 2007) identify barriers such as language and culture. Second language (L2) students find it even more difficult to cope with seeking information. They find it hard to search, retrieve, and access the needed sources, and have different information needs than that of native language students (Bhatti, 2010; Zhixian, 2007). These students need to take the extra step to linguistically decode information they have found. Although L2 undergraduate students have some awareness of the quality needed for research literature and are familiar with scholarly searches of electronic sources, they continue to cite inferior sources (Radia & Stapleton, 2008; Stapleton, 2005).

Israeli students

In Israel, several studies have been published on the usage patterns, literacy, and information needs of Israeli students. In two studies of Israel college students (Avigdori, 2000; Chai, 2008) there was no correlation between ethnic group or mother tongue and information resources usage. Differences were found between students studying in various fields or faculties, especially in their approach to searching and using academic databases and their attitudes towards the use of English-language sources. In a study (Mizrachi & Shoham, 2004) of students of teaching colleges, it was found that information and computer technology expertise leads to English language information sources usage. In a study of Israeli nursing students (Zafrir, 2011) the author found that good English language proficiency enables better information search and usage. Furthermore, Arab students found it more difficult to use keywords and search strategies in English, because it is their third language. In their study about information seeking behavior of Arab students in a teaching college, Chai and Shoham (2012) note that the Arab student population learns their preliminary studies in elementary and high school in their native language of Arabic. This radical transition from the Arab speaking environment to the Hebrew speaking environment of the college or university leads to alienation and difficulty integrating into the academic system. In their study they found that the subjects preferred people (friends, colleagues, teachers, and librarians) as their first choice of information source.

Our study tried to understand the information seeking behavior of the library users: what is the preferred search environment and how are the searches conducted? The next chapter in our review tries to answer these questions.

Information seeking behavior of academic materials

In their academic searches, students turn first to their easiest, time saving, familiar and most accessible option (i.e., Internet search engines) rather than to the library's qualified academic sources (Greenberg & Bar-Ilan, 2014; Lee, Paik, & Joo, 2012). Students tend to save themselves the effort of dealing with the library's discovery tools and databases (Thompson, 2003). Accessing information on the web is much faster and easy to use. It offers students the answers they need to review information quickly (Biddix, Chung, & Park, 2011; Connaway, Lanclos, & Hood, 2013). Studies conducted over the last decade indicate that for their academic assignments, students tend to use Internet search engines more than they search library resources (De Rosa, 2006; Greenberg & Bar-Ilan, 2014; Metzger et al., 2003; Currie, 2010). Tenopir (2003) surveyed and analyzed a group of studies on how users use electronic library resources. Her findings were categorized by Yi and Herlihy (2007), who concluded that users have six major expectations when they search for research materials:

- 1. To be able to do their research online*
- 2. To be self-sufficient*
- 3. Ease of access*
- 4. Access 24/7*
- 5. Seamless access to navigate different interfaces*
- 6. Support for navigation and browsing within the system*

Studies of information seeking behavior concluded that users act according to the Principle of Least Effort (Colon-Aguirre, Freberg, & Allard, 2011), ease of use, and convenience (Connaway, Dickey, & Radford (2012). The minority of students and faculty search library collections for their academic information needs (Case, 2012). From the total time devoted to looking for information used in research and course work, only a small portion is spent in campus libraries. Data from the Project

Information Literacy (PIL) Progress Report (Head & Eisenberg, 2010) indicate that students are driven by familiarity and habit and use the same set of information resources for academic searches. They relied on librarians infrequently, if ever; whether they were conducting research for course work or for personal use. Most respondents considered themselves apt at finding and evaluating information, especially when it was retrieved from the web.

While the literature reports on the predominance of search engines in the role of fulfilling students' information needs, researchers' information seeking behavior seems to be different. The ease of access and ease of use provided by electronic resources made it easier for researchers to access and share scientific knowledge. In their report on the "National study of information seeking behavior of academic researchers in the United States", Niu et al. (2010) asked researchers about their preferred search tool. The answers were split almost equally between the Google search interface and search tools provided by the library. The primary discovery tool reported was a bibliographic citation or bibliographic database, followed by a general web search engine. A previous study by Haglund and Olsson (2008), found that young researchers in their thirties use Google and Google Scholar for scientific information and they prefer it over subject-specific databases. Their conclusion is that libraries and library services are perceived as complicated, while other sources (such as Google) are easy to use. In a study about researchers' use and perceptions of discovery services in the UK (Jubb, Look, & Sparks, 2007), the findings indicated that Google and Google Scholar were the most frequently mentioned information sources, but for tasks such as finding a reference or literature review, or researching a new area, most users make use of other tools such as internal library portals and catalogues, and specialist search engines.

The academic library is required to understand the information seeking behavior of its users and to develop its services accordingly. The library should become an important resource in the patrons' search environments. In the next part of the review we present the subject of academic libraries and their role in fulfilling patrons' information needs.

Academic libraries: a user-centered approach

Academic libraries in the 21st century are beginning to realize that to best meet users' needs, they must first look at user preferences (Finnell & Fontane, 2010). Library literature shifts from collections to experience and expertise, from mediation to

enabling. The information products are generally produced outside the libraries, so the library advantage comes from its services and from librarians' professionalism. Some studies claim that the future of library focuses less on the library institution and more on the people who work in the libraries: the librarians (Oakleaf, 2010; Webster & Flowers, 2009).

Historically, the quality of a library has been measured by the size of the collection (Hernon & Altman, 2010). The academic faculty was (and still is) supposed to "publish or perish" and each author wanted the library to purchase his published works. Nowadays, libraries seek to purchase access to more electronic sources while focusing on their customers' information needs and the affordability of those sources. Given the new Internet tools and the explosive growth of digital content available on the web, the role of the academic library and the services it should offer are now not entirely clear (Lewis, 2007).

Libraries serve as a mechanism for making knowledge available in communities and organizations. As technology changes, there may be other better mechanisms and libraries should embrace and support them. An examination of the library's role should be made; library as an information seeking tool, as a supplier of qualified resources, and as a mean of sharing and embedding expertise into teaching, learning, and research. This examination should include both the professionals (librarians) and the library's computer-mediated systems (Lewis, 2007). In the classrooms librarians can provide guest lectures, online tutorials, and library orientation guides. Librarians can provide support for the academic staff on research data management (Peters & Dryden, 2011; Tenopir, Sandusky, Allard, & Birch, 2014) such as contributing to grant proposals, preparing impact factor reviews of faculty publications, and reviewing the literature for patent applications.

The academic library empowers its users by providing self-help guides, easy to search information systems, and remote access to its services, and by enabling connection to its subscriptions via Google Scholar. Having done that the library is still a very complicated physical and virtual environment and it needs to simplify the services' interfaces and availability. The library must include user satisfaction as its main goal and both librarians and the information systems should target this purpose (Hernon & Altman, 2010). Library patrons experience the physical library and the web library. They assess the library in the context of the collections, the services, the applications, and the technologies. They work in the library from the classroom, in the laboratory,

and at home. The academic library needs to be available to anyone, anywhere, anytime, and anyhow especially due to the ever-changing technologies (Henry, Vardeman, & Syma, 2012; Lewis, 2007, Neal, 2009; Oakleaf, 2010).

A high priority for libraries should be to acquire the necessary tools to effectively and efficiently evaluate its functions and services. Libraries are now entering an age of not only statistical data gathering, but also of their use and assessment. The emphasis on the library patrons' needs should be reflected in measures and methodologies for demonstrating service quality and value that are user-focused and user-driven. The patrons who interact with any library service are the reason for the organization's existence. Therefore their needs and desires should drive the service. The libraries need to learn about their patrons and evaluate the ways in which the library and its services support them (Broady-Preston & Lobo, 2011; Dotson & Garris, 2008; Hernon & Altman, 2010). Libraries are still searching for mechanisms which accurately describe their effectiveness. They need to be more proactive in rigorously analyzing and demonstrating the value of their activities (Broady-Preston & Lobo, 2011).

Studying and analyzing patrons' information behavior and needs will help libraries to adjust their services to be more effective and useful. The next part of our review addresses library services, elaborating on the subject of search interfaces and reference services.

Library services

The Internet has opened up new technological capabilities that potentially enable libraries to be a key part of the larger information community. The collections are accessible and the information is digitized, and basically everyone in the world can search and retrieve it (according to copyright laws). Libraries are facing threats and challenges in their current situation; high expectations of the users, intensive technological change and the emergence of social media. All these factors form an uncertain future for the library and the librarians (Priestner & Tilley, 2012; Tarulli, 2013). Most libraries have embraced mobile technologies, social media and have integrated other search services (like Google Scholar). The librarians understand it is essential to move to the digital natives' virtual environment and provide adjusted services.

The academic libraries are in the process of rethinking the effectiveness of their services, both in the physical and virtual environment. The services include selection and acquisition, print management (circulation, reserves, Inter library loan), electronic management (licensing, usage tracking), digital asset management (repository, access), metadata management (cataloging), combined search solutions, link resolution (Open URL) and mediation solutions (virtual reference). Libraries need to decide which services create the difference in leading the library to become a preferred source of knowledge and information for the patrons. Maybe some of the services can be done by outsourcing agents, to save time and money and to enable the professional staff to concentrate on the "core" services (Grant, 2012). Library mission and values should be clear and stated. Librarians should strive for new applications and technologies, to better understand all the places the user can get his or her needs met. This includes an understanding of where the library will fit the purpose and where other applications or services will do better. One of the most important characteristics of the digital breakthrough is that it breaks down the barriers of geography and time. The library is coming to the user, not vice versa; it should not be seen as a centrally placed institution but as something students and researchers are surrounded by (Nielsen & Eriksson, 2002). Academic libraries must identify the opportunities that are open to them and take the view that all threats are really opportunities in disguise. Collaboration with co-libraries, faculty, and students can produce advanced and important changes (Ayriss, 2012).

Analyzing users' needs, experience, and expectation will help libraries to adopt its services accordingly. Data on patrons' information behavior, information needs, and preferences will help the librarians to provide better, unique, customized, and effective services. In the next sections we address two of the library services we examined in our research.

Reference services

Personal communication with library patrons can be referred as a holistic approach to library services. This approach enables the librarian to guide and influence information behavior and information access of the user. The communication can be available in face-to-face reference interaction and in personal meetings, or via online virtual personal interaction. The personal contact offers an opportunity for the user to get an

impression of the library and the librarian. In this way the librarians can emphasize the advantage they can offer over Google. Reference services have always sought to assist individual users (Cassell & Hiremath, 2012). The librarian interacts with a patron on a one-to-one basis, whether in person or virtually. The reference librarian must be skilled at helping users to find information and answers for their questions, quickly and effectively. A reference librarian also develops intuition of when to be an information provider and when to be an information literacy instructor.

The way in which librarians provide the reference service and the way they meet their users information needs has changed considerably (Prabhakar & Atchamamba, 2016). Virtual reference dominates the current practice on reference and information services (Leonard & Morasch, 2012). Although the mission and goal of the reference remain the same, the way it is provided is changing constantly. It is possible to reach users no matter where they are, via email, chat, Facebook, Twitter, or any other application. Millennials feel at home with instant messaging, chat, and other virtual environments. Meeting them on their own turf may strengthen a library's presence and help to advertise what librarians can do for information-seeking users. Perhaps the most dramatic shift in library services has been the transition from purely physical reference interactions to a combination physical/virtual or even a virtual-only environment (Christopherson, 2011; Finnell & Fontane, 2010; Grant, 2012). Analyzing transactions at the reference desk (physical and virtual) reflects the information needs of patrons at an academic institution, and helps libraries adjust accordingly.

Virtual reference services (VRS)

Responding to user demand and technological trends, the libraries provide web-based virtual reference services (VRS) as alternatives to traditional face-to-face (FtF) references (Radford & Connaway, 2007; Shachaf & Horowitz, 2008). The Reference & User Services Association (RUSA) Guidelines (2010) for implementing and maintaining virtual reference services state simply: "Virtual reference is responsive to the patrons' need for convenient access to reference services" (p. 1). VRS include asynchronous (e.g., email), and synchronous (e.g., instant messaging/chat) formats. Library patrons increasingly turn to VRS for anonymity, convenience, and extended hours (Tenopir, 2004). Virtual reference (VR) is when the patron and the librarian do not have a physical encounter (face-to-face). One of the principal reasons for providing

virtual reference is to increase access to the knowledge and skills of the reference librarian (Lee, 2004; Thomsett-Scott, 2013). In the late 1980s, libraries adopted email as a form that allowed users to send questions to reference librarians and receive a response, usually within 24 hours and often much sooner (Lee, 2004). In the late 1990s the concept of VR was born (Thomsett-Scott, 2013). Chat technologies that have been used primarily for social purposes have enabled librarians to conduct real time reference interviews with patrons online.

VR creates a new working environment for the reference librarians. During the VR interaction in email or chat there are no visual or audio cues to guide the reference interview (Bopp & Smith, 2011; Lee, 2004; Ronan, 2003). Librarians have to adjust and communicate effectively with remote users and translate the interpersonal skills used at the physical reference desk into the virtual environment. Librarians transition from years of FtF interaction to a mode of engagement where conversational moves are sometimes unclear, nonverbal signals are missing, and language often deviates from accepted forms (Christopherson, 2011). Dialogues in instant messaging (IM) for example (e.g., chat), are best kept brief because it is hard to read comments longer than two lines, and because the recipient experiences dead time while long messages are composed (Ronan, 2003). Users become impatient and disconnect if librarians take too long, and sometimes they simply leave the interaction without any notice (Wikoff, 2008).

It is important to choose VR technologies that suit the patrons' needs and to develop a marketing plan (Thomsett-Scott, 2013; RUSA, 2010). If a certain technology has low usage, it should be removed, although the reference staff must make sure that its lack of use is not due to poor marketing (Cummings, Cummings, & Frederiksen, 2007; Nicol & Crook, 2013). Usage analysis of reference interactions can provide useful feedback for reference librarians to improve the service of the library to its patrons (Finnell & Fontane, 2010). In the literature, there has been some debate over the effectiveness of VR and whether these services are cost-effective based on usage rates and staffing concerns. However it is becoming clear that the services are going to continue and indeed expand (Burger, Park, & Li, 2010). Each user can choose the best way to communicate with the reference staff (Cassell & Hiremath, 2012; Connaway & Radford, 2011; Mu, Dimitroff, Jordan, & Burclaff, 2011; Steiner, 2011). In the context of the nature of VRS, the patrons get less instruction and training (Steiner, 2011). Due

to the type of interaction in the FtF reference service, the librarian can visually demonstrate search strategies and skills. In virtual reference, however, it is challenging to recognize teachable moments.

In academic libraries, virtual services serve all patrons. Faculty as well as students embraced electronic resources and services to varying degrees (Moyo, 2004). User preferences are shaped by several factors (Nicol & Crook 2013), with some of the most researched being the perceived convenience of a service, the online skills of the user, and the type of information a user is seeking. Chow and Croxton (2012) report that convenience is important across all library user groups (students, faculty, and staff), and their preferences are also linked to their age and the kind of research they are involved in. Some studies (e.g., Nicol & Crook, 2013; Radford & Connaway, 2010) found that students who are comfortable in the online environment are likely to find virtual reference both convenient and familiar. Virtual reference services (mostly via email), receive a large percentage of research questions (Fennewald, 2006; Foley, 2002; McCulley & Reinauer, 2007) similar to the types of questions asked at a physical reference interaction.

Information seeking at the library

It is nearly impossible to discuss search and discovery in libraries without mentioning Google. Google's simple interface, speed, and breadth of content have set the standard for searching both among library users and within the library community. Nielsen (2005) described a user model of web search as including a search box for query entry, a search button to run the search, and a list of results arranged by relevancy. In their study, Khoo and Hall (2012) analyzed users' interaction with the library search interface. They came up with some key observations: the search page should include tools such as auto-correct and an easy to find 'help' page; the search results page should make sense of large numbers of results and easily connect to full text resources; and there should be an easy to find advanced search page and an option to write in natural language. When a user faces different models of search interfaces we can expect usability problems. The challenges library users encounter with dozens of different interfaces seem outdated and daunting (Lown, Sierra, & Boyer, 2013; Way, 2010). Librarians organize, aggregate, store, and filter information sources thoughtfully, to make them available and to support study and teaching. Many academic libraries offer

database A–Z lists, or databases by subject as a directional guide. However, users are presented with too many choices and have little knowledge of where to begin. Library patrons have difficulty identifying appropriate databases, accessing each one individually, understanding its unique search mechanism, and running separate searches for each database. Information overload has become another issue; users have online access to a large number of subscribed databases with little understanding of what they are. Library patrons often do not distinguish among the library web site, library print resources, and online databases. Libraries find that their faculty and students are confounded by dissimilar search interfaces that discourage the full use of information sources (Curtis & Dorner, 2005; Dempsey, 2008; Jasek, 2004; Wang & Mi, 2012). Aware of this problem, libraries have long sought solutions that would allow users to access library resources without having to select a specific database or the library catalog. In the late 1990s and early 2000s, as described in the literature, libraries identified federated searching as the solution (Curtis & Dorner, 2005; Tennant, 2000). The tool reduces time and effort spent in both searching and learning to use the various interfaces. It broadcasts a query across all sources, returning one organized list of results to the user (Ellero, 2013). Library gateway search services embraced the federated search as a complementary service for online access catalogs. As libraries entered this transition, it was important to better understand user search behaviors and practices; in particular, models for user searching within the OPAC environment (Mischo, Schlembach, Bishoff, & German, 2012).

Federated search, also called metasearch, parallel search, or broadcast search, is defined as searching different resources at the same time and then presenting the search results in a unified way. Federated search tools' limitations are also well documented, including an inability to refine searches to the desired degree, problematic interfaces, and results lists that are difficult to use and interpret. Relevance ranking is also problematic when running parallel searches on multiple databases, and more recently, federated searching has come under attack for not being compatible with smartphones and other mobile technologies (Asher, Duke, & Wilson, 2013). Discovery tools came to maturation in 2007 with OCLC's WorldCat Local, followed by Serials Solutions Summon in mid-2009, and EBSCO Discovery Service (EDS) and Ex Libris Primo Central in 2010 (Asher, Duke, & Wilson, 2013; Vaughan, 2011). There is competition and ongoing discussion and debate as to the strengths and weaknesses of the different discovery tools. Still, federated search or a discovery service are vital tools to increase

search ability and discoverability of library resources. One search interface for multiple resources will help users to discover the relevant content from unfamiliar resources. It will also save users considerable search time. Librarians can offer their skills in teaching patrons where to start searching and acquiring accurate and updated information (Kuhlthau, 1997; Wang & Mi, 2012).

Library metrics

Libraries need to monitor their services efficiency by aggregating data from all available sources. Next we specify a few data sources used in our study.

Google Analytics is an analysis and reporting tool of web data, and provides information such as the number of visits and the number of users (Clifton, 2012). It is used by researchers for the study of user behavior, web site effectiveness, and web traffic, allowing web site administrators to study their users' online experience and to improve it (Clark, Nicholas, & Jamali, 2014; Clifton, 2012). Google Analytics enables libraries to track user behavior in the library web site, together with data from digital library repositories and search services. Libraries can learn about their patrons' information needs and behavior and improve their user experience on the library web site (Hess, 2012).

Open URL link resolvers are an essential tool for libraries to offer links to electronic journal articles and other library resources. The technology is designed to remove obstacles from users searching electronic items. It enables the searcher to go directly from an individual reference to the full text referred to by that citation, with one mouse click (Liu & Zheng, 2011; Yi & Herlihy, 2007). Studies indicate that the implementation of an open URL link resolver directly contributed to an increase in the usage of library resources (Yi & Herlihy, 2007). Librarians benefit from an open URL link resolver that allows measuring student/faculty use of the electronic scholarly resources and enables the libraries to observe their patrons' information behavior (Imler & Eichelberger, 2011; Ponsford, Stephens, & Sewell, 2011).

COUNTER – Counting Online Usage of NeTworked Electronic Resources

The COUNTER standard enables measuring online usage in a well-defined, consistent way. Libraries need to understand better how the information they purchase

from a variety of sources is being used, and publishers want to know how often the information sources are being accessed. To meet these objectives, an agreed international set of standards and protocols was established for recording and exchanging online usage data (COUNTER, 2014).

Google and the academic library

As mentioned earlier in the review, Google has become the major search interface for library patrons. We conclude with a review of Google Scholar and its ambivalent relationship with the academic library.

Google has become a powerful presence in the life of all library users. It is the most popular search engine for queries on daily issues and for academic needs. Google empowers library users to search from an easy popular interface, for their academic information needs (Miller & Pellen, 2014). In the libraries some consider it an obstacle and some see it as an opportunity for new innovations and improvement. One thing is certain: Google redefined the search experience and the libraries should recognize it. In 2004 Google launched a tool for discovering scholarly information: Google Scholar, a search engine for academic articles, theses, books, abstracts, and court opinions, from academic publishers, professional societies, online repositories, universities, and other web sites. This free resource, with its basic and familiar interface, could potentially serve as a scholarly metasearch information engine (Asher, Duke, & Wilson, 2013; Neuhaus, Neuhaus, & Asher, 2008, Wenzler, 2008). Google Scholar has met a mixed reception from the librarian community. It has some advanced search features, but it provides no interface for refining the results. Users can set preferences such as language, year, author, and periodical title, indication of the libraries with which to link, citation export options in results, and how to cite the source (for different citation rules). The reviews and critiques of Google Scholar have been, at best, mixed. The content, the search engine, the interface, and the citation counts of this product have all been criticized (Jacso, 2005; Pomerantz, 2013). Yet, it is probable that academic scholars are attracted by the simplicity and ease of accessibility, constant improvements, and coverage. Patrons of libraries who have subscriptions to the digital archives of publishers are the greatest beneficiaries of Google Scholar, since with a single search they are led to the full digital text versions of the articles. The coverage of Google Scholar is impressively broad and includes the most important scholarly publishers'

archives, although there is no information about the publishers whose archives Google searches (Asher, Duke, & Wilson, 2013; Callicott & Vaughn, 2005; Jacsó, 2005; Noe, 2012). Furthermore, the library staff does not know precisely what the Google Scholar index includes and what it leaves out. There is no guarantee that all of the library's licensed content is included in Google Scholar (Rochkind, 2007). In his study, Rochkind noted that at Johns Hopkins University "Google Scholar has become the largest single source of links to our link resolver product" (p. 28). Combined with its recognizable name brand and reputation among students as an easy to use source of information, Google Scholar's adoption on university and college campuses is becoming a significant trend (Colon-Aguirre, Freberg, & Allard, 2011; Fry, 2016; Kean, 2016). Even though Google Scholar offers only limited access to academic sources, it provides adequate information to satisfy most users' needs. The literature discusses Google Scholar as an entry-level research tool that introduces patrons to the rich resources available at the library (Jacsó, 2005; Miller & Pellen, 2014; Rochkind, 2007; Vecchione et al, 2016; Wenzler, 2008). However, some studies suggest that the simple search used in the Google Scholar interface, inaccurate metadata, lack of usage statistics, and inconsistent coverage across disciplines, lead patrons to use more sophisticated and expert databases to answer their information needs (Asher, Duke, & Wilson, 2013; Howland, Wright, Boughan, & Roberts, 2009; Noe, 2012; Pomerantz, 2013; Wenzler, 2008). Google Scholar is very different from a library database interface and search options, yet it introduces the library users to scholarly articles through a familiar friendly interface. It can be used as a means for information literacy instruction for connecting students with resources that better meet their information needs. The librarians' role is to assist users to find information, by simplifying the interfaces of the aggregators and databases, and Google Scholar can serve as a satisfactory service for this purpose (Miller & Pellen, 2014).

Methodology

The objective of this research was to investigate multiple aspects of academic library users' information behaviors. We analyzed the students' perspectives in the context of seeking information for coursework, the library services from the virtual reference perspective, and data from the publishers' subscriptions and library systems log files, to gain a better understanding of patrons' use of library services, means of access, and

information seeking behavior. This research utilized quantitative-qualitative, mixed-method research methodologies (Teddlie & Tashakkori, 2009). Both the quantitative and the qualitative methodologies were planned and implemented to answer related aspects of the same basic research questions. The mixed method data analysis enables the integration of the statistical and thematic techniques, plus other strategies like content analysis and coding. The method refers to the combination and comparison of multiple data sources and analyses procedures. The motivation to choose mixed methods in our research was the belief that the quality of a study can be improved when the biases, limitations, and weaknesses of a method following one approach are counterbalanced, or compensated for, by mixing with a method belonging to the other approach (Fidel, 2008). Quantitative data collected from survey research provided descriptive statistics about the patrons' academic information behaviors. Qualitative data reflects users' information needs and preferences. Log analysis data reflects patrons' access behavior. The qualitative research tends to give more attention to the aspects of human experience and behavior (Connaway & Powell, 2010). Grover and Glazier (1985) claim that qualitative research methods in library and information science research can be useful for gathering data about information users' behavior and information needs. In this section, we describe the research methods and tools used in the three articles. All data were anonymous and no reference was made to a specific person or subject. The students who answered the questionnaire met with the researcher and explanations were given about the study and its purpose. The main data source for the articles was the University of Haifa Library (Younes and Soraya Nazarian library in northern Israel). The researcher - being a staff member in the institution, had access to patrons, librarians and information systems log file data.

Research questions

- 1 What are the library patrons' academic information behaviors?
 - 1.1 What is the role of the academic library in the patrons' information seeking behavior?
 - 1.2 What is the role of the academic library in the patrons' access information behavior?

- 2 Where do library patrons find their information sources?
 - 2.1 What is the use of the library discovery tool?
 - 2.2 What is the use of search engines (Google Scholar)?
- 3 What are the Israeli students' information needs and information behavior in searching information for an academic assignment?
- 4 How do the libraries' virtual reference services fulfill the patrons' information needs?
 - 4.1 How many of the library patrons' information questions are answered in the virtual reference services?
 - 4.2 What are the reference librarians' perspectives on the virtual reference services
(See Appendix 2 - Librarians' open-ended questionnaire)
 - 4.3 How do the virtual reference services compare with the traditional face-to-face reference services, according to the reference librarians?
 - 4.4 How do library patrons use VRS?

The first article

The first article, "Information needs of students in Israel — A case study of a multicultural society" (Greenberg & Bar-Ilan, 2014), was published in the Journal of Academic Librarianship. The study aimed to research undergraduate and graduate information needs, information behavior, and difficulties in searching and writing an academic assignment. The research tool used in this study was a questionnaire, utilizing quantitative and qualitative questions. The questionnaire was based on data collection instruments administered in similar user studies described in the library and information science literature (Head, 2008; Head & Eisenberg, 2010). The initial questionnaire was tested in a pilot using three randomly chosen undergraduates (December 2012). The questionnaire comprised twelve questions: closed questions (some multiple choice and some Likert scale), partially open questions, and open questions (see Questionnaire no. 1 in Appendix 1). The questions were designed to answer the research questions

addressing the selection of information sources and associated factors in undergraduate and graduate students' search tasks:

- 1** What are the sources of information used by the students?
 - A. What information resources do students select to perform academic tasks?
 - B. Are students critical of their choices of information resources?
 - C. Are they using the library resources to research their academic assignments?
- 2** What is the process of writing an academic assignment?
 - A. How do the students search their information sources?
 - B. What do the students define as important factors motivating the process of academic work?
- 3** What are the most difficult stages for students when preparing an academic assignment?
- 4** How do students acquire their information skills?

A call for the survey was sent out to selected lecturers (who collaborated in the past with library initiatives), from eighteen departments covering all seven faculties (Education, Humanities, Law, Natural Sciences, Management, Social Sciences, and Social Welfare & Health Sciences) of the university. Ten lecturers from four faculties agreed to participate (Humanities, Natural Sciences, Social Sciences, and Social Welfare & Health Sciences). The questionnaire was administered to the students in courses selected by the lecturer, during class time (January 2013). The survey was given on paper and in person to ensure a higher response rate. The process yielded 151 complete questionnaires. This sample was intended to represent the student population of the university. The sample comprised a majority of Jews born in Israel, a minority of native-born Arabs, and a minority of Jewish immigrants (mostly from the former Soviet Union). This was well reflected in the distribution of the mother tongue of the participants: Hebrew (100 students, 69%), Arabic (33 students, 23%), and Russian (14 students, 8%). The participants' age groupings were divided according to the Israeli Central Bureau of Statistics data sheets, and it was closely reflected in the demographic data (Central Bureau of Statistics, 2010). In terms of gender, 54 (38%) of students were male and 89 (62%) students were female. The questionnaires were anonymous, but we asked the students to provide demographic details to enable a deeper analysis. The answers were tabulated using Microsoft Excel. For the closed questions, distribution of

the answers was calculated and for the open questions' written answers, a content analysis was applied, to provide additional insight when interpreting the results. The open questions included specification of information sources and search sources used in the last assignment.

The second article

The second article "Ask a librarian: Comparing virtual reference services in an Israeli academic library" (Greenberg & Bar-Ilan, 2015) was published in Library & Information Science Research. The study aimed to understand how the virtual reference services by chat and email were used, and how they compared to the more traditional FtF service. The research questions were:

- What are the main characteristics of the email and chat virtual reference services (question and answer types, volume)?
- Are there different emphases between the two VR (chat and email) services?
- How do the librarians view the differences between FtF and VR reference services?
- What were the librarian's attitudes towards the VR services?

The study utilized a mixed quantitative and qualitative method for conducting analyses of the virtual reference transactions at the University of Haifa's library. Two virtual reference services were studied: email and chat. In addition, a comparison was made between the results and the reference librarians' answers to the open-ended questionnaires. The librarians were asked about their attitudes and opinions regarding virtual reference services and FtF reference services. Virtual reference transactions that occurred in December 2012 were analyzed, and the reference librarians were surveyed in October 2013. The study included all transactions using email (213 exchanges) and chat (116 interactions) that occurred during December 2012. The library's reference staff ($n = 16$) (70% response rate) filled out an open-ended questionnaire in October 2013.

The virtual reference (VR) data were collected and coded (using Excel data sheets), including patron affiliation (only for email sessions).

Transcript analysis and categorization were applied to examine several aspects of virtual reference services (Burger, Park, & Li, 2010) such as quality of an answer,

correctness of an answer, interpersonal communication, and adherence to appropriate reference guidelines. I chose to use this analysis, which in my opinion better reflects the reference interactions, based on my expertise and my practice as a reference librarian. The reference service is meant to fulfill users' information need. So the analysis based on the question asked and the given answer, are in my opinion the best way to evaluate an effective reference interaction. In this study I chose to analyze the questions separately from the answers and to index each question and answer with its own characteristics. The categorization applied is based on Burger, Park and Li work (2010) with additions I thought necessary to complete the transcripts analysis.

Various systems of categorization are in use to evaluate reference services. Connaway and Radford (2011) for example, used a set of questions to be asked about factors that influence the use of VRS, the difference between librarians and users expectations and satisfaction from the VRS and especially in compare to face-to-face (FtF) reference encounters.

The following are details of classifications that formed the basis of the classification in this study. Mann (1998) distinguished between “Reference Questions” as ready-reference questions and “Research Questions” that can be more time consuming. Schwartz (2004) used a typology that considered *who* is the patron, *what* he was asking, and *how* the library staff processed the answers. The “how” category could be answered either by “answers” or “referrals”. In the “what” category the questions were grouped into reference, non-reference, and known item. In Schwartz’s typology, every question belonged to one of six categories: statement only, factual, provide, need, advise, and instruct. Moeller (2004) classified VR email data by type of patron, type of question, and librarian response. The question types were divided into six categories: in-depth questions, policy, explanatory, lookups, short answers, and questions about the library. Each category had a few subcategories.

In our research classification, codes were given both to questions and answers. Each reference interaction was classified according to *who* was using the service, *what* the patrons were asking, and *how* the questions were answered (Mann, 1998; Schwartz, 2004 ; Moeller, 2004). The categories and subcategories for the *what* question appear in Table 1, while the categories for the *how* answers appear in Table 2. Content analysis (Neuendorf, 2002) was applied to the patrons' questions and to the librarians' answers

in both email and chat services. The content of 10% of the reference sessions was analyzed using two coders. The inter-coder reliability was 91%; i.e., there was 91% agreement on the categorizations. The rest of the VRS interactions were analyzed by the author of this dissertation. The librarians' answers to the open-ended questionnaire were compared with the results of the content analysis.

Table 1: *The content categories and subcategories of **what** with explanations*

Question types asked by the library patrons	Subcategories
<i>In-depth questions</i>	<ul style="list-style-type: none"> • Questions on a specific subject A "classic" research question, request for items on a specific subject (e.g., quality of life in a senior citizens' community) • Specific source without bibliographic details The patron is looking for a source she knows little about (e.g., a published English translation of a specific book published in Italian) • Specific material type on a specific subject Non-book materials such as movies, maps, satellite images (e.g., a movie describing child abuse in a Muslim orthodox family) • Electronic full text items on a specific subject Request for a bibliography of items on a specific research question comprising only freely accessible (for library patrons) electronic full text items • Hebrew items on a specific subject Request for bibliography of Hebrew items on a specific research question
<i>Short and quick answers questions</i>	<ul style="list-style-type: none"> • Citation finder Full text access to a specific item given by the patron (e.g., "Can you please send me this article?") • Circulation issues Renewal of books, reserving an item from the catalog, question about fines, etc. • Citation rules

	<p>How to cite a bibliographic item according to citation rules of the American Psychological Association (APA) the Modern Language Association (MLA), etc.</p> <ul style="list-style-type: none"> • Reference manager <p>Options to open an account, or instruction and support for Refworks or Endnote</p> <ul style="list-style-type: none"> • Miscellaneous short questions
<i>Instruction</i>	<ul style="list-style-type: none"> • Technical support <p>Access problems to library resources or subscriptions</p> <ul style="list-style-type: none"> • Remote access <p>General instructions or password problems</p> <ul style="list-style-type: none"> • Database tutorials <p>Request for instructions or tutorials on a specific database or feature</p>
<i>Policy</i>	General information about library services

Table 2: *Content categories of how with explanations.*

Answer types given by the library reference staff (email and chat VR services)	Explanation
<i>Bibliography lists sent to the patrons</i>	The patron receives a detailed bibliography according to her request (books, articles, Hebrew items, full text articles, etc.).
<i>Tutorial and screen shots for explanation</i>	The librarian sends detailed instructions, attaching a tutorial or a screenshot to illustrate the explanation.
<i>Forward to another service</i>	The librarian cannot answer the question because of lack of time or information, so the patron is advised to forward the question to another service (in the library or in the

	university). Forwarding can also be suggested to another reference service like email or face-to-face desk reference.
<i>Full text items</i>	Attachment of an electronic version of an article or a link to it.
<i>Informative answer</i>	The patron is given information about one of the library services or other services in and outside the campus (e.g., “Here is the address of the student administration. You can check with them”).
<i>Link to Google Scholar search results</i>	The librarian performs the search according to the user’s information needs. She sends the patron a link to the Google Scholar search results for review and selection.
<i>No answer</i>	The librarian fails or cannot answer the patron's question (e.g., cannot find an electronic format of a certain book).
<i>Clarification</i>	The librarian needs more details to answer the question (e.g., “There are thousands of theories on x. Please provide specific date range or authors”).
<i>Partial answer</i>	The librarian can only answer part of the question asked (e.g., found only one item, cannot seem to find the other title mentioned).
<i>Keywords</i>	The patron is given keyword suggestions for a search (e.g., “You can use the words xyz in your search”).

The library’s reference staff questionnaire comprised eight questions regarding VR services in comparison to face-to-face reference (see Questionnaire no. 2 in Appendix 1). The categorization and the distribution of the questions and answers were presented to them and we inquired whether in their opinion and based on their experience the distribution of the VR questions and answers were similar to the distribution of questions and answers in face-to-face encounters. They were asked whether virtual or physical reference service suited better the library's patrons, in their minds. They were also queried about the main differences between VR and physical reference services.

The third article

The third article is titled "Library metrics; studying academic users' information retrieval behavior. A case study of an Israeli university library" (Greenberg & Bar-Ilan), and has been accepted to the *Journal of Librarianship & Information Science*. The purpose of the study was to get insights on library users' information and retrieval behavior, as reflected in log files, reports, and publishers' counts. It utilizes data collected from the University of Haifa's library systems log files.

The data were intended to answer the research questions addressing the information access and retrieval behavior of library patrons. More specifically:

- Where do library patrons access full text information sources?
- What is the use of the library discovery tool in comparison to other search interfaces (mainly Google Scholar)?
- How do library patrons use the library home page?
- What is the use of the library's open URL link resolver?

The study focuses on quantitative analysis of data from the log files. The study uses several data sources, log files from the library's open URL link resolver; publishers' records of full text downloads accessed through the library's subscriptions, and the library's home page hits and visits reports as documented in Google Analytics. Data were provided for the period between January 2011 and June 2014. All data were collected and processed using Excel data sheets. From these 42 months, 18 months (for which we had full records because some data were missing for some of the months) were selected and the data were carefully analyzed.

Logs from the open URL link resolver were analyzed from two aspects:

- Requests the link resolver received from the library's discovery tool
- Requests the link resolver received from Google Scholar

Google Analytics data of the library's web site were used to compare the use of the library discovery tool to the number of visits to the library home page. Data on requests from the "open URL link resolver" received from the library's discovery tool were collected and compared with the publishers' report on full text downloads.

Methodology summary

All three articles intended to examine information behavior, from different aspects. We gathered different distinct data sets to answer our research questions from a few perspectives. In a questionnaire given to the students we received their viewpoint and information behavior regarding academic coursework. In the content analysis of the virtual reference services interactions, we studied the information needs and information behavior of the library patrons, as reflected in their information requests. We also studied the strengths and weaknesses of each virtual reference service and the reference librarians' perspectives on the reference interactions as a mediator for fulfilling patrons' information needs. We used log analysis and data from the library information systems to track patrons' use and behavior in searching and retrieving academic information. All three aspects can reflect the information behavior of the academic library patrons; the users' experience, the professionals' experience (the librarians), and the data received from the digital environment of the library.

We chose to address our research questions with various research tools. We used mixed methods, combining quantitative and qualitative methods, to make the best of the data we had.

The usage data were collected over three and a half years, and the information systems were monitored from 2011 to mid-2014. Log files and the data received from the different measuring tools demonstrated a longitudinal distribution of trends. We used the same study environment for the three studies, analyzing the patrons and the use of the academic library of the University of Haifa from three parallel perspectives. The study observed the process of information seeking, retrieval, and behavior of the library patrons.

Articles

Information needs of students in Israel – A case study of a multicultural society

*"Ask a librarian" Comparing Virtual Reference Services in an Israeli
Academic Library*

Library metrics; studying academic users' information retrieval behavior. A case study of an Israeli university library.

Discussion

We may sit in our library and yet be in all quarters of the earth.

John Lubbock

This dissertation presents three studies of library's patrons' information needs, retrieval, and behavior. This chapter discusses the findings and relates it to the current research in the library and information science (LIS) literature, in order to extend our understanding of the academic library use. We address each research question separately and suggest some insights.

Our first question concerned the library patrons' information behavior. What is the role of the academic library in the patrons' information seeking behavior and what is the role of the academic library in the patrons' access information behavior? The first article, "Information needs of students in Israel — A case study of a multicultural society" (Greenberg & Bar-Ilan, 2014), answered the first question examining the information behavior of the library users and the role of the library in fulfilling their needs, by analyzing undergraduate and graduate information needs and information behavior, in searching and writing an academic assignment (even though it reflects only on the students and not the faculty).. In our study we specifically addressed three recent studies on the information behavior of students. In their study, Head and Eisenberg (2010) examined the information seeking strategies and research difficulties of American students. Niemand (2010) explored the information seeking behavior of South African students, and Lee, Paik and Joo (2012) studied Korean students from a university in Seoul, in achieving their academic search tasks. The study yielded very similar results to these studies, although we observed some differences due to multicultural characteristics that are discussed below. The most difficult stage of the course-related assignments' process was getting started. In her work, Kuhlthau (1997) also found that librarians should assist students in getting started with their search for a project, because they find it difficult to do it by themselves. The second most difficult stage was writing, and the next two stages were finding the relevant information from the search results and extracting the relevant information for their assignment, as also found by the PIL survey studying information seeking strategies and research difficulties of American students (Head & Eisenberg, 2010). Finding information on the web was the easiest stage for the

students, even though they faced problems in retrieving relevant information, which possibly indicated their lack of proficiency in conducting an academic information search. When searching for information for an academic assignment, the students reported that the Internet (via search engines and Google Scholar) is their primary source of search, even though they thought library sources are more trustworthy and require less evaluation. This finding resembles other studies in LIS literature (Head & Eisenberg, 2010; Fry, 2016; Kean, 2016; Lee, Paik, & Joo, 2012; Niemand, 2010). Our findings show that both undergraduate and graduate students gained their academic search skills through self-exploration. This finding can be explained by the fact that as the students interact with the digital environment in their daily lives, they do not need comprehensive instruction on using or interacting with technology and they tend to learn by exploration (Niemand, 2010).

The third article, "Library metrics; studying academic users' information retrieval behavior. A case study of an Israeli university library" (accepted to the *Journal of Librarianship & Information Science*), also answers our first research question on the library patrons' information behavior. What is the role of the library in fulfilling their needs and what is the patrons' access information behavior? Data collected along three and a half years (2011-mid-2014) indicate that patrons are using the library's discovery tool to some extent. When retrieving full text from the citation linker service, there is more use of the library discovery tool than of Google Scholar. On average, the discovery tool yielded 95% more requests than Google Scholar. We were unable to find previous studies that relate to the use of the library citation linker and compare requests coming from different sources. The data presented in the study cannot testify to the use of the discovery tool in comparison to Google Scholar, only in the context of the library citation linker. Data from the open URL link resolver service (Ex Libris SFX) capture only some of the requests for full text articles. These findings refer to users who choose to use the citation linker service from the library discovery tool, or from Google Scholar. It is important to note that Google Scholar users can choose to use the citation linker to the library subscription, or to click on the article title and retrieve the full text of the article (if it is a part of library subscriptions) directly from the publisher. As mentioned before, the patrons do use the library discovery tool to some extent. The discovery tool enables users a single point of access, which leads to a wide range of library content through a Google-style search box (Asher, Duke, & Wilson, 2013). In

their study, Asher and colleagues (2013) found that library faculty and staff noted the need to have “a single point of entry” or a “Google-like interface” for library databases. Convenience is a criterion in people’s choices and actions during all stages of the information-seeking process. In their search, users expect to retrieve relevant results. The library discovery search system employs mechanisms to help and guide individuals to the best set of resources (Ellero, 2013). It relies on descriptive metadata (from the library resources, e.g., subject databases), which assist effective retrieval and enable refining and limiting the results.

The findings of both full text download requests and the library’s discovery tool full text requests enable us to speculate about the library patrons’ access and retrieval behavior. Data collected from publishers reports (according to The COUNTER standard) and the discovery tool full text requests indicate that patrons access full text items from other information sources (such as Google Scholar and publishers' sites) 3.1 times more than accessing full texts from the library discovery tool. The huge difference between the use of the library discovery tool and other search interfaces (assuming the main alternative is Google Scholar and not publishers’ sites) is well supported by the literature. Recent studies suggest that students use Google Scholar instead of library sources to retrieve and access information sources, both for their course work and research assignments. In their academic searches, students turn first to their easiest, time saving, familiar, and accessible option (i.e., Internet search engines) rather than the library's qualified academic sources (Greenberg & Bar-Ilan, 2014; Currie, 2010; Lee, Paik, & Joo, 2012; Vecchione et al, 2016). Connaway, Dickey, and Radford (2012), found that the concept of convenience can include choice of an information source, satisfaction with the source, and its ease of use. Some studies point out that Google Scholar can be an alternative to more expensive databases and that its advantages include free access and basic interface (Colon-Aguirre, Freberg, & Allard, 2011; Neuhaus, Neuhaus, & Asher, 2008). Others claim that the algorithms Google Scholar uses to return result sets cannot really be compared to library database algorithms (Howland, Wright, Boughan, & Roberts, 2009); however, the more publishers share their content with Google Scholar, the effectiveness of the search increases. Due to the fact that library patrons can use the library's subscription to the digital archives of publishers through Google Scholar (Jacsó, 2005), they are becoming more efficient in their information searches. They can search in their favorite interface and access a specific information source. In his study, Pomerantz (2013) suggests that library users

can enjoy the advantages of Google Scholar, but when they need to find more comprehensive information, they turn to library sources and reference professionals. It is important to note that discovery tool usage increased over the years, from 2011 (10,131) to mid-2014 (19,646) by 94%. Upon analyzing the difference between the library's discovery tool full text requests and publishers' count from 2014 data, findings indicate that the gap narrowed from 3.1 (for the whole period) to 2.3 (i.e., patrons accessed full texts via other information sources 2.3 times more than via the library discovery tool in 2014). From these findings we can assume that retrieving full text from the discovery tool search box became more popular and accessible as library users became more familiar with the service. Findings from Google Analytics comparing the library's home page sessions with the sessions count of the search box (in the selected 18 months between 2011 to mid-2014), indicate that every second user on average who enters the library web site also uses the federated search tool (48,931 for the library discovery tool session vs. 96,726 for the web site session count). These findings reflect the use of the library web site and its main function – the discovery tool search box. In this study's findings, half of the sessions on the library web site use the discovery tool search box. According to the library web site analytics data, we can assume that the search box placed in the center of the page creates an easy navigating environment for the users. In his work on designing library web sites, Jasek states that "most users come to a library site wanting to do research, and the shorter their paths, the happier they are" (Jasek, 2004, p. 10). In this study, the discovery tool search box enabled the users to enter their search query on the library's home page. The result page appears in the discovery tool interface and users are invited to refine the results or to access the full text (if available).

In addressing our first research question (what are the library patron's information behaviors), we conclude that in light of our findings and the extensive literature on the subject, the majority of the students use search engines to search for their academic assignments. The students find the library sources trustworthy and reliable but also difficult to use. The vast majority of library patrons use Google Scholar more often than library discovery tools and databases, while taking advantage of Google Scholar's ability to connect to library subscriptions. Using library subscriptions indicates that the library continues its role in providing access to resources regardless of where the user

discovered and retrieved them. Google Scholar may not bring users physically to the library, but it can link users with resources provided by the library.

Our second research question relates to the Israeli students' information needs and information behavior in searching information for an academic assignment. The first article, "Information needs of students in Israel — A case study of a multicultural society" (Greenberg & Bar-Ilan, 2014), answered this question. A study of Israeli students yields very similar results to recent studies published in the literature. The study observed some differences due to multicultural characteristics between the different native language groups (Hebrew, Arabic, and Russian) in searching and writing an academic assignment. The study examined the information behavior of Israeli students living in a multicultural society. In our sample, we were able to differentiate between three groups of students: Jewish Israeli-born students whose native language is Hebrew, Arab Israeli-born students whose native language is Arabic, and Jewish immigrants from the former Soviet Union whose native language is Russian. We saw significant differences between these three groups in their responses to several questions. Using search engines for retrieving academic information was the preferred method for the Hebrew and Russian language groups. The Arab language group barely uses it. This may be because the Arab-speaking population probably has more difficulty using English language sources and keywords (Zafir, 2011; Chai & Shoham, 2012). Another finding emerging from the data was the statistical significance in the "Ask a librarian" section. We asked the students if one of their ways to search for information is to use the library reference services. Both the Hebrew and the Russian language groups answered no; they hardly used it. In contrast, the Arab language group frequently used the services. In the literature we find that the foreign language students showed a stronger interest in reference instruction/orientation/workshops and reference services (Liao, Fin, & Lu, 2007). Since this population seemingly has a problem with English language proficiency (Zafir, 2011), the library staff needs to inform the students about the reference services and how to use them (Chai & Shoham, 2012). Another point that strengthens this conclusion is in the section where we asked about finding English keywords before retrieving information. A statistically significant difference was found between the Arab language students who reported less use in comparison to the Hebrew and Russian language groups who reported high use. When asked about the use of the citation finder in the library web site, all three populations

indicated a high use of this option. This can imply that the Russian immigrant students and the Hebrew native students may do their searches on the web but in order to retrieve the full text of an article they use the library subscriptions. Both third language populations — the Arab and the Russian native language groups — tried to choose a similar topic for all their assignments, but the Hebrew native language population chose a different one each time. This can be explained by third language students finding it harder to search, retrieve, and access the needed sources and having different information needs from native language students (Bhatti, 2010; Zhixian, 2007). These students need to take the extra step to linguistically decode the material they find (Stapleton, 2005; Radia & Stapleton, 2008).

In addressing our second research question (Israeli students' information needs and information behavior in searching information for an academic assignment), we conclude that in light of our findings and the literature on the subject that Israeli students are similar to students around the world in their information needs and behavior. The study did point out some significant differences between three native language groups (Hebrew, Arabic, and Russian) in response to several questions regarding their preferred method of information retrieval, using search engines to find academic information and the use of library services.

Our third research question studied one of the library's main services – the reference. We asked how do the libraries' virtual reference services fulfill the patrons' information needs? And more specifically; how many of the library patrons' information questions are answered in the virtual reference services? What are the reference librarians' perspectives on the virtual reference services? How do the virtual reference services compare with the traditional face-to-face reference services, according to the reference librarians? In addition, how do library patrons use virtual reference services? We addressed these questions in our second article, "Ask a librarian: Comparing virtual reference services in an Israeli academic library (Greenberg & Bar-Ilan, 2015). We analyzed two types of virtual reference services at the Library of the University of Haifa in Israel: email and chat. The virtual reference services transcript analysis provided an opportunity to study the behavior of both librarians and users in the virtual reference encounter.

To examine how many of the library patrons' information questions are answered and how library patrons use virtual reference services, we first studied the questions asked

in the virtual reference. In the email service, most questions (52%) were *in-depth questions*. This is well reflected in the literature where studies show that virtual reference services (mostly via email) receive a large percentage of research questions (McCulley & Reinauer, 2007; Fennewald, 2006). Fennewald (2006) also found that when patrons used the online services, they used them primarily for “reference” questions. Previous studies concluded that the use of the virtual reference is determined by the information need of the patron (Nicol & Crook, 2013). Academic staff members have a clear preference for email virtual reference, which is suitable for asking research questions (Croxtton & Chow, 2011). In the current study there are data on the user type only for the email service, thus we cannot reach conclusions regarding the service preference per user type. In the chat service, unlike the email reference, a large percentage of the questions (42%) were *short questions*, mainly asking for a specific item by its bibliographic details or circulation queries. Only 21% of the enquiries were *in-depth reference questions* on this platform. In contrast with the results in this study, Lee (2004) found that chat enquiries tended to have higher proportions of research and reference enquiries, and email questions tended to have a higher proportion of administrative questions. On the other hand, Sears (2001) observed a considerable lack of higher level research questions when using the virtual reference chat service.

In the second part of the study we analyzed the answers given in the virtual reference services. We did not evaluate the answers based upon their accuracy, but we labeled it as answered, referred, or other, for both virtual reference services by email and chat, using the same categorization. In the email virtual reference service the most frequently occurring answer type (27%) was *bibliographical lists of items on a specific subject*, and the next most frequently occurring category was *instructional and tutorial answers* (21%). In the chat service, the distribution was different; in more than a third of the cases (37%) questions were not answered directly but forwarded to another service. Of these forwarded questions, 34% were short citation finder questions and 28% in-depth research questions. Sixty-three percent of the forwarded questions were sent to another reference service like the reference desk or the email virtual reference. Another 21% of the questions were transferred to circulation and 16% to technical support. These findings clearly show that the core service of the email virtual reference was to give answers to in-depth research questions (conducting a bibliographic search or providing search instructions). According to the analysis of the chat transactions, a large

percentage of the questions were not answered but forwarded to another service, which means that in many cases patrons did not fulfill their information needs. It is important to mention that the formal policy of the chat service was to answer quick reference and the e mail service was meant to address "in depth" subject questions. Recent studies indicate that in some libraries the chat virtual reference service is popular and high in use. In their study, Chow and Croxton (2013) found that online chat was rated highest in effectiveness, efficiency, and satisfaction among the virtual reference services. One reason for this was that transactions were faster using chat in comparison to all other services. Nicol and Crook (2012) examined the use of the chat service in Washington State University's library and came to the conclusion that only two years after the service was launched, it became a service that is growing and thriving both in terms of use and in the way it is valued by the reference staff. Wikoff (2008) surveyed why chat transactions end prematurely. The most common reason given by the librarians in her study was lack of time to answer a patron's reference questions. Wikoff (2008) suggests that adding more librarians to the chat shift would reduce pressure, enabling them to assist waiting users and conduct a thorough interview. This would maximize the benefit from the answers. Pomerantz and Luo (2006) concluded there might be a mismatch between users' expectations of chat reference services and what they provide according to the reference policy and the librarians behavior. The high percentage of unanswered questions possibly affects user preference and satisfaction with this service and results in even less use of the chat reference. We believe that the chat service should change its orientation and policy so it will meet user's expectations and fulfill patron's information needs.

When we tried to compare the traditional face-to-face reference interaction and the virtual reference interaction, we asked the reference librarians' opinions. First, we asked them to comment on the categorization created for the analysis of the virtual reference services interaction (both questions and answers). The reference staff thought it represented also the face-to-face reference desk inquiries. This is reflected in Fennewald's study (2006), which found that the traditional categories used to classify questions presented at reference desks can be successfully applied to online reference services. An important issue arising from the results is the instruction given to the patrons as a direct result of the face-to-face reference encounter. Connaway and Radford (2011) found that users are not as interested in receiving instruction as

librarians are in giving it, although they are more receptive in face-to-face encounters. This is reflected also in Fennewald's study (2006) that claims that libraries' emphasis is given to instruction. The process of a reference interaction involves showing the user the best strategy to solve the problem presented. Moreover, sometimes librarians offer strategies rather than specific sources to their academic patrons. From the results it appears that face-to-face is the preferred reference service by librarians. Most of them indicated the face-to-face interaction is more effective and educational. Not only do librarians prefer face-to-face reference interaction, so do the patrons, according to several studies (Chow & Croxton, 2012; Connaway et al., 2009; Connaway & Radford, 2011; Nilsen, 2006; Mu et al., 2011). Students indicated that the physical, person-to-person reference desk provides efficient help for their information needs. One of the studies (Chow & Croxton, 2012) indicated that reference librarians believe that online chat is "without a doubt" the most popular virtual reference medium choice for library patrons. In their study they claim most patrons have on demand, real-time information needs and the chat service fulfills both quick factual questions and research questions. The process of refining a user's question to provide a useful, relevant answer was also mentioned as one of the strengths of face-to-face reference services. A similar conclusion was reached by Burger et al. (2010). They found that users often do not ask the question that clarifies the essence of their query, while in face-to-face interviews, nonverbal cues can help the librarian get to the essence of a question. Studies also focused on the tone of the user's voice, age, facial expressions, *and* nonverbal and visual cues of understanding or frustration (Bopp & Smith, 2011; Nilsen, 2006; Ronan, 2003). Prabhakar and Atchamamba (2016) believe that reference librarians are more likely to spend time providing face to face guidance to users rather than serving as an intermediary between users and information. Nilsen and Ross (2006) found that with the virtual reference services, the reference interview almost disappeared. The LIS literature is divided into studies that support the face to face interaction advantages and to those who found chat interaction better supports the patrons' information needs. Finally the librarians thought that the best reference service depends on the users and their information needs. This conclusion (that the best chosen reference service depends on the user) is well reflected in the literature. In her book, *Implementing Virtual Reference Services*, Thomsett-Scott (2013) claims that each user has their own preferences. Some value anonymity, while others prefer a more personal communication. Steiner (2011) writes that the physical reference remains the best

option for those who feel their questions are too nebulous for quick answers or who prefer the familiarity of working with a known and trusted librarian. Participants in the study of Chow and Croxton (2013) appear to prefer the specific type of reference medium that most conveniently meets their needs at any given time. Connaway and Radford (2011) suggested that VRS allows libraries to offer an alternative that may be important to students who find face-to-face interactions intimidating. We believe that the library should offer a variety of reference services and each user should find the service that suits her best.

In addressing the third research question—how do the libraries virtual reference services fulfill the patron's information needs—we conclude that there are differences between the chat and email virtual reference services. According to one of the major findings the chat virtual reference service does not satisfy the library users' information needs. Face-to-face reference interaction was found as the preferred reference service by librarians even though they believed that the best reference service depended on the users and their information needs.

In this chapter, we discussed three studies focusing on library's patrons' academic information needs and behaviors concerning three major research questions. Where do library patrons find their information sources? What are the Israeli students' information needs? How do the libraries virtual reference services fulfill the patrons' information needs? We included the current research's unique findings and contributions with the theoretical LIS framework. According to prior LIS studies that examined information seeking behavior, Google is the preferred information source for research (Palfrey & Gasser, 2013; Peet, 2014). In our current research, we came to the same conclusions. When searching for information for an academic assignment, the students reported that the Internet (via search engines and Google Scholar) is their primary source of search. Another finding supporting this claim is the data collected from publisher's reports and the library's discovery tool full text requests, which indicate that library patrons access full text items from Google Scholar (or the publishers' sites) three times more than they access full texts from the library discovery tool. The most noteworthy information behavior is the tendency to use the familiar, easy to use search interfaces for academic information. Ease of use was the most important criteria in the users' information behavior. These findings match the literature in this subject (Colon-Aguirre, Freberg,

& Allard, 2011; Connaway, Dickey, & Radford, 2012; Head & Eisenberg, 2010). Users act according to the Principle of Least Effort, ease of use, and convenience in their information seeking and accessing behavior decisions. Regarding the means of access, several prior studies suggest that library patrons use Google Scholar instead of library sources to retrieve and access information sources (Greenberg & Bar-Ilan, 2014; Currie, 2010; Lee, Paik, & Joo, 2012). In the current research, library patrons utilized Google Scholar as their main information access channel. They used its interface to search and retrieve academic information, and the library subscription was utilized to access the full text information. The findings indicate that some of the user's access full text through the library's URL link resolver, and most of them use the direct link from the Google Scholar source title. Our findings demonstrate that the use of the library discovery tool is increasing and the users are aware of its advantages in retrieving qualified, easy to access academic information for their needs. According to the literature, library discovery tools have emerged and developed in the past years. They reduce time and effort spent in both searching and learning to use the various interfaces of the library information sources (Curtis & Dorner, 2005; Ellero, 2013; Tennant, 2000).

The Israeli student's uniqueness was found in the multicultural differences in library use. Third language students (the Israeli Arab minority) tended to use the library resources as their preferred interface. They also tended to use more library services than other student populations, due to their language difficulties and the need for mediation and help from the librarians. Finally, to study another facet of patrons' information behavior, we analyzed their use of the virtual reference services. We found that as was learned from the current literature, research questions were the most popular category in the email services (Croxtton & Chow, 2011; McCulley & Reinauer, 2007; Fennewald, 2006). Our current research also examined the chat virtual reference service and found a mismatch between librarian answers to the information requests. In a survey conducted among the reference librarians, face-to-face reference service was mentioned as the best way to answer the patrons' information needs, but the staff members also believed that users must choose the reference service that suits them best.

This study contributes to the current research on the library's role as an information access source, by strengthening the assumption that easy to use search interfaces will improve library use and will empower users to choose to search in the library. The

library continues to provide qualified academic resources to patrons. The patron can use a free Internet database (like Google Scholar) and still be able to access the library subscriptions. The library also needs to customize and adjust its services to support users' information needs. Following this study, some changes were made in the library. The most noticeable one is in the reference chat service. The service policy was changed and updated.

Limitations

The research was performed in the setting of the University of Haifa and the data were gathered from the students and the library. The university has distinctive characteristics and a unique composition of student's population. It is located in the north and serves the northern periphery of the country. In addition, the University of Haifa library (Younes and Soraya Nazarian library), is one central library with unique and advanced services, which doesn't necessarily represent other academic libraries in Israel, so the findings may not be generalizable. As the researcher is a member of the library staff, it may affect the interpretations of the results in the discussion as suggested in the study. Our study was performed over three and a half years. Its findings are suitable to that period. Due to the rapid changes that are common in the academic libraries, the search engines, the information systems, and the users' digital literacy, within several years the study may be irrelevant.

The first article:

- The study focused on how the students performed their academic tasks but not on why they chose to do it in a certain way.
- We did not perform a controlled study and our sample was not random.
- The study has no representative sample of all faculties on the campus.
- In the language groups we had only fourteen students from the Russian native language group.
- The data collection method (questionnaire) did not include observations of the participants' academic information behavior, and as such it relies exclusively on their thoughts and impressions.

The second article:

- The lack of age and gender information in the chat VR makes it hard to analyze user group preferences.
- The lack of statistics on face-to-face reference services and telephone reference services does not allow us to get a clear picture of how significant email and chat use is at the library, compared with the more traditional services.
- We did not check why and when users choose virtual reference over traditional face-to-face reference.

The third article:

- The lack of information on the source of requests for full text downloads from the publishers does not allow us ascertain whether the majority of the requests were received through Google Scholar.
- Some data are confidential. We could not address any demographic details of the library patrons to learn about information behavior and use of the library resources in different population types.

Future research directions

There are a number of potential research directions for extending the current research to further understand the information behavior of the users of academic libraries and the role of the academic library in searching and retrieving information.

The studies focused on how Israeli students search and retrieve information for their academic tasks, how they access and retrieve their information sources, and what kind of help they require.

An interesting follow up study would be how they choose their information sources. What are their preferences and why, in their opinion, do they prefer to use one search interface over another.

A more thorough study should be made of the librarians' role as intermediaries between information sources and the library patrons through the reference services. A follow up study can be performed by analyzing different means of reference services including

an observation of face-to-face reference interactions. This observation can be followed by an interview-based study, to learn about patrons' preferences and reasons for choosing one reference service over the other.

It would be also interesting to study the use of the library federated search and discovery tool search systems. Analyzing the digital footprints of the patrons' search process, together with content analysis of the search strings, would enable an important point of view on the library users' information behavior.

To find the best practice for the chat virtual reference, a follow up study is requested. Assuming that necessary changes have been made to adjust the service to users' expectations, the chat virtual service interactions should be analyzed using the same content analysis criteria we have established for this research.

A study on further data mining of the publishers' count is needed. The purpose of this mining will be to find the source of the full text request, either from the Google Scholar search engine or other search interfaces and databases.

Conclusion

Libraries have always served as the mediators between the users and the information. The growth of the Internet and the ubiquity of digital technologies have led to the proliferation of information sources and means of access. Adoption of technology by libraries has had the effect of enabling and empowering users to seek information for themselves and has made searching and retrieval more accessible and available.

Academic libraries co-exist in today's dynamic information environment alongside alternative information sources and the means to access academic information. The future of the academic library is dependent on it being relevant for its patrons. This dissertation research was conducted to derive insights that may point the academic library in new directions and provide additional avenues for research.

In this research we studied information behavior to better our understanding of the new generation of library patrons; the proficient, independent digital natives. The research represents a broad picture of academic library use from three different perspectives: the

students' academic information behavior; the information sources and the means of access and retrieval information behavior of the library patrons; and the library reference librarian's point of view and analysis of the mediation the library offers through virtual reference services.

No single search tool can ever be truly comprehensive—library discovery tools, Google, and Google Scholar included. The most successful search interface will be the one that focuses on user needs and preferences. Methodologies such as those used in this study will help libraries to better understand their users' information needs and to strive to adjust their search tools accordingly.

Librarians know that students prefer Google's ease of use, but they also know that it cannot always represent values such as credibility and reliability. By enabling library users to access library information sources and using library subscriptions, through Google Scholar, the library continues its role in providing access to resources, regardless of where the user discovered and retrieved them.

Finally, this dissertation was written from the perspective of academic libraries' important role in the life of higher education's population. Due to its important role in the academic environment, the library must be attentive and responsive to new technologies and the users' needs and behaviors, to continue to provide suitable solutions and remain a major part of academic life.

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Appendix 1 - Students' information needs questionnaire (translation from Hebrew)

This questionnaire is a part of a study examining information needs of students at the University of Haifa. All data you provide will be used for research purposes only. Thank you for your cooperation.

1. What is the most difficult stage in preparing an academic assignment?

	Not difficult	Minor difficulty	Medium difficulty	Hard	Very hard
Starting it	1	2	3	4	5
Defining the subject	1	2	3	4	5
Finding search terms	1	2	3	4	5
Finding information in databases	1	2	3	4	5
Finding information from the Internet (Google, Wikipedia)	1	2	3	4	5
Finding up-to-date information	1	2	3	4	5

Finding only the relevant information	1	2	3	4	5
Reading the information sources	1	2	3	4	5
Writing the paper	1	2	3	4	5
Citing the references	1	2	3	4	5
Deciding to finish the assignment	1	2	3	4	5
Self-evaluating the assignment	1	2	3	4	5

2. What information sources did you use in your last assignment?

3. What kind of search sources did you use in your last assignment?

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4. When you write your academic assignment, what sources will you use?

Sources	Not in use	Small degree	Medium degree	High degree	Very high degree
Course reading	1	2	3	4	5
Search engines	1	2	3	4	5
Wikipedia	1	2	3	4	5
Library web site	1	2	3	4	5
Google Scholar	1	2	3	4	5
Ask a librarian	1	2	3	4	5
Ask a teacher	1	2	3	4	5
Classmates	1	2	3	4	5
Social Web	1	2	3	4	5
Ready assignments web sites	1	2	3	4	5

5. Do you prepare your academic assignments using library resources?

- A. Yes, only library resources**
- B. Yes, using more resources that I find on the web**
- C. No, I use resources other than the library**
- D. Depends on the assignment**

6. What is stopping you from making better use of the library?

- A. Physical conditions**
- B. Opening hours**
- C. Staff is not friendly**
- D. Most of the library information sources are in English**
- E. There is nothing that prevents me from making better use of the library**

7. What is the frequency of using these content sections in the library home page?

Content sections in library web site / extent of use	Very small degree	Small degree	Medium degree	High degree	Very high degree
Search box	1	2	3	4	5
Databases	2	2	3	4	5
Information services	1	2	3	4	5

Reference	1	2	3	4	5
Opening hours	1	2	3	4	5
Refworks	1	2	3	4	5
Remote access	1	2	3	4	5
Highlearn	1	2	3	4	5
Citation finder	1	2	3	4	5

8. To what extent do you find the library sources trustworthy?

- A. Not trustworthy**
- B. Slightly trustworthy**
- C. Moderately trustworthy**
- D. Largely trustworthy**
- E. Very trustworthy**

9. When you find a source (other than an article in a scientific journal) online, to what extent do you check any of the following?

	Very small degree	Small degree	Medium degree	High degree	Very high degree
Update	1	2	3	4	5
Who is the author	1	2	3	4	5

Affiliation of the web site (private, academic, governmental)	1	2	3	4	5
Does it have bibliography or reference	1	2	3	4	5
Social Web (Facebook, forums)	1	2	3	4	5
Ready assignments web sites	1	2	3	4	5

10. These sentences describe the ways you could search for sources when writing an academic assignment (consisting of 4-6 pages minimum). To what extent do you use them?

Patterns in conducting an academic assignment/ Extent	Very low	Small	Medium	High	Very high
When I have found the number of sources requested by the lecturer, I stop searching	1	2	3	4	5

Patterns in conducting an academic assignment/ Extent	Very low	Small	Medium	High	Very high
If I cannot find the required sources in one or two searches, I try to change the subject	1	2	3	4	5
To start a search, I look for keywords or basic search terms in Hebrew	1	2	3	4	5
To start a search, I look for keywords or basic search terms in English	1	2	3	4	5
I tend to use the same information sources for all my assignments	1	2	3	4	5
I try to pick a similar subject for different assignments to save time	1	2	3	4	5
I spend the same amount of time on each assignment	1	2	3	4	5

11. How important are the following factors when you prepare your academic assignments (consisting of 4-6 pages minimum)?

Important factors in writing an academic assignment	Very small degree	Small degree	Medium degree	High degree	Very high degree
Good grade	1	2	3	4	5
Pass the course	1	2	3	4	5
Finish on time	1	2	3	4	5

Important factors in writing an academic assignment	Very small degree	Small degree	Medium degree	High degree	Very high degree
Meet the required scale	1	2	3	4	5
Learn something new	1	2	3	4	5

12. How did you acquire your academic search skills?

- A. With the help from my family members and my friends**
- B. Learned by myself**
- C. Instruction from the library or my department**
- D. Other_____**

Demographic details

I am a studying for my

- A. B.A**
- B. M.A**
- C. PHD**
- D. Other_____**

My native language is

- A. Hebrew**
- B. Arabic**
- C. Russian**
- D. Other_____**

Year

- A. First**

- B. Second**
- C. Third/Last**
- D. Other**_____

Department _____

Age group

- A. To 23**
- B. 24-27**
- C. 27-33**
- D. Other**_____

Gender

- A. Male**
- B. Female**

Appendix 2 - Librarians' open-ended questionnaire

Dear librarian,

As part of our research we conducted an analysis of both chat and email VR services. We will be glad if you would reply to the attached questionnaire to supplement our analysis.

1. To characterize the contents of the remote reference services questions (advised by email and chat), we established a number of categories. Do you think they also represent the contents of the face-to-face reference encounter?
2. To characterize the contents of the remote reference services answers (advised by email and chat), we established a number of categories. Do you think they

also represent the contents of the face-to-face reference answers?

3. In relation to the results of the content analysis of the questions received by the **email** remote reference service, in your opinion, if we analyze the content of the face-to-face reference encounters would we get a similar distribution of questions?
4. In relation to the results of the content analysis of the answers received by the **email** remote reference service, in your opinion, if we analyzed the content of the face-to-face reference answers would we get a similar distribution of answers?
5. In relation to the results of the content analysis of the questions received by the **chat** remote reference service, in your opinion, if we analyzed the content of the face-to-face reference encounters would we get a similar distribution of questions?
6. In relation to the results of the content analysis of the answers received by the **chat** remote reference service, in your opinion, if we analyzed the content of the face-to-face reference answers would we get a similar distribution?
7. How do you see the difference between the types of reference services (email, chat, or in person)?
8. Which reference service is more significant for the customers (email, chat, or in person)?

"הספרייה יכולה להראות לך הכל, אם רק תדע איפה לחפש".

Pat Conroy - My Reading Life

עבודה זו מציגה מחקר שהתפרסם בשלושה מאמרים הבודקים את התנהגות המידע של לקוחות הספרייה האקדמית, באוניברסיטה בישראל.

פרוט המאמרים לפי סדר פרסומם (או קבלתם לפרסום):

1. Greenberg, R., & Bar-Ilan, J. (2014). Information needs of students in Israel—A case study of a multicultural society. *The Journal of Academic Librarianship*, 40(2), 185-191.
2. Greenberg, R., & Bar-Ilan, J. (2015). "Ask a librarian": Comparing virtual reference services in an Israeli academic library. *Library & Information Science Research*, 37(2), 139-146.
3. Greenberg, R., & Bar-Ilan, J. Library metrics; studying academic users' information retrieval behavior. A case study of an Israeli university library." accepted to *Journal of Librarianship & Information Science*.

המחקר בדק את התנהגות המידע של לקוחות ספריית אוניברסיטת חיפה (ספריית יונס וסוראיה נזריאן), משלושה היבטים. תפיסת הסטודנטים את צרכי המידע והתנהגות המידע האקדמיים שלהם, התיווך לו נזקקים לקוחות הספרייה באמצעות שרותי היעץ הווירטואליים ובאיזו מערכת חיפוש ואחזור מידע, משתמשים לקוחות הספרייה.

מטרת עבודה זו היא לעזור לספריות אקדמיות להיות מודעות לצרכי המידע של לקוחותיהן בעשור השני של המאה ה-21 ולהפוך את שרותי הספרייה לזמינים ויעילים. אנו מאמינים שהבנת צרכי המידע והתנהגות המידע של המשתמשים, תתרום לתחום המידע והספרנות הן ברמת המחקר והן ברמה המעשית לתפקיד הספרייה כמקדמת לימוד ומחקר באקדמיה. מחקרנו כלל מספר שיטות מחקר כדי לבדוק התנהגות המידע של לקוחות הספרייה האקדמית; שאלון מחקר שהופץ בקרב סטודנטים כדי ללמוד על התנהגות המידע שלהם, ניתוח תוכן של מפגשי יעץ וירטואליים וניתוח קבצי לוגים ממערכות מידע של הספרייה.

העבודה מורכבת מחמישה חלקים. החלק הראשון מציג את המוטיבציה מאחורי המחקר וסוקר את הספרות המקצועית ואת העבודות שנעשו בנושא בעולם. החלק השני מתאר את שיטות המחקר בהן נעשה שימוש בעבודה. החלק השלישי מציג את שלושת המאמרים, כפי שפורסמו בכתבי העת בתחום מידענות וספרנות. בחלק הרביעי מוצג דיון בתוצאות והסקת מסקנות והחלק החמישי כולל רשימת מקורות בהם נעשה שימוש בחלקי העבודה השונים.

סקירת ספרות

חלקה הראשון של הסקירה כולל הגדרות של המונח "התנהגות מידע" בקרב סטודנטים, מהו תפקיד הספרייה כחלק ממנו וכיצד התחום של מידענות וספרנות מתייחס למונח בספרות הקיימת. המחקר בדק התנהגות מידע בקרב סטודנטים ישראלים ולכן התייחסנו בסקירה לצרכי המידע והמאפיינים הייחודיים שלהם.

החלק השני של הסקירה התייחס למשתמשי הספרייה האקדמית. מיהם ילידי הדור הדיגיטלי (Digital natives) שמהווים את רוב לקוחות הספרייה, מהם הרגלי החיפוש והתנהגות המידע שלהם. חברת הסטודנטים בישראל היא חברה המאופיינת ברב תרבותיות ולכן בדקנו עבודות המתייחסות לנושא בהקשר השימוש בספרייה האקדמית. בעיקר נתנו דגש לעבודות שנכתבו על סטודנטים בישראל. המחקר שלנו נדרש להבין מהם הרגלי חיפוש המידע של לקוחות הספרייה ולכן בדקנו מהי סביבת החיפוש המועדפת עליהם, כיצד הם מבצעים חיפוש ומדוע.

היות ועיקר מטרתה של העבודה הוא לבדוק שימוש בשרותי הספרייה האקדמית, החלק השלישי של הסקירה הוקדש לנושא זה. עסקנו בהרחבה באפיון שרותי היעץ והתפתחות שרות היעץ הוירטואלי. עוד פרטנו את נושא החיפוש במקורות המידע של הספרייה. ערכנו סקירה של התפתחות ושינוי בממשק החיפוש.

לבסוף, בגלל שחלק גדול מהתוצאות העיד על שימוש נרחב שעושים המשתמשים בגוגל האקדמי (Google Scholar) התייחסנו לקשר המורכב בין מנוע החיפוש גוגל לבין הספרייה האקדמית.

שיטות המחקר

מטרת המחקר היתה לחקור מספר היבטים של התנהגות מידע של לקוחות הספרייה האקדמית. בדקנו את הסטודנטים ועמדותיהם בהקשר של חיפוש מידע לצורך כתיבת עבודה אקדמית, שרותי הספרייה מנקודת המבט של שרות היעץ הוירטואלי ונתונים של המוציאים לאור על השימוש במנויי הספרייה ולוגים של שימוש במערכות הספרייה. המחקר עשה שימוש בשיטת מחקר כמותית ואיכותנית ולעיתים עשינו שימוש ביותר משיטת מחקר אחת כדי לקבל מענה על אותה שאלת מחקר. השימוש בשתי השיטות אפשר לנו שילוב בין ניתוחים סטטיסטיים, ניתוחים השוואתיים ושיטות קידוד וניתוח תוכן. עוד נעשה שילוב בין נתונים ממקורות שונים שעברו עיבודים בהתאם. נתונים כמותיים שנאספו בשאלון צרכי מידע, אפשר לנו ניתוח סטטיסטי של התנהגות המידע של לקוחות הספרייה. ניתוח איכותני של מפגשי יעץ וירטואליים ותשובות לשאלות פתוחות בשאלון צרכי מידע ובשאלון שבדק עמדות ספרני היעץ, אפשר לנו לבדוק מהם צרכי המידע של המשתמשים ולהפיק מהם תובנות חשובות. ניתוח נתונים מקבצי לוגים ומדוחות שימוש אפשר לנו למפות את ערוצי הגישה של המשתמשים למידע.

מקור המידע העיקרי שלנו היה משתמשי ספריית יונס וסוראיה נזריאן, באוניברסיטת חיפה. הספרייה היא ספרייה מרכזית ואנו בדקנו דפוסי שימוש במערכות שלה. בנוסף, ערכנו סקר בקרב סטודנטים באוניברסיטת חיפה ובקרב ספרני היעץ של הספרייה.

שאלות מחקר

1. מהי התנהגות המידע של לקוחות הספרייה האקדמית?
 - א. מהו תפקיד הספרייה האקדמית בהתנהגות חיפוש המידע של לקוחותיה?
 - ב. מהו תפקיד הספרייה האקדמית בהתנהגות איחזור המידע של לקוחותיה?
2. היכן מוצאים לקוחות הספרייה את מקורות המידע שלהם?
 - א. מהו השימוש בכלי הגילוי של הספרייה?
 - ב. מהו השימוש במנועי חיפוש דוגמת גוגל וגוגל אקדמי?
3. מהם צרכי המידע והתנהגות המידע של הסטודנטים בישראל כשהם מחפשים מקורות לכתיבת עבודה אקדמית?
 4. כיצד שרות היעץ הוירטואלי מספק את צרכי המידע של לקוחותיו?
 - א. כמה משאלות המשתמשים נענות בשרות היעץ הוירטואלי?
 - ב. מהן דעותיהן והשקפתם של ספרני היעץ, אודות שרות היעץ הוירטואלי?
 - ג. מהי מידת האפקטיביות בשרות היעץ הוירטואלי בהשוואה לשרותיה יעץ המסורתיים (מפגשים פנים מול פנים), לדעתם של ספרני היעץ?
 - ד. כיצד משתמשי הספרייה עושים שימוש בשרותי היעץ הוירטואליים.

מאמר ראשון

במאמר הראשון נעשה שימוש בשאלון הבדוק התנהגות מידע. מטרת המחקר היתה לבדוק כיצד הסטודנטים מחפשים מידע עבור עבודותיהם באקדמיה. עוד בדקנו מהם ההבדלים בין דוברי שפות אם שונות (עברית, ערבית ורוסית) בהתנהגות החיפוש שלהם.

במחקר נותחו תוצאות של 151 שאלונים שמילאו סטודנטים מארבע פקולטות, באוניברסיטת חיפה. תוצאות המחקר היו דומות למחקרים דומים שנעשו בעולם, הבדלים מעניינים נמצאו בין דוברי שפות האם השונות.

לצורך איתור מידע עבור עבודה אקדמית, ציינו הסטודנטים דוברי שפת האם עברית ורוסית את מנועי החיפוש באינטרנט ככלי החיפוש הראשון אליו ייגשו ואילו דוברי שפת האם ערבית ציינו את מקורות הספרייה. ממצא מעניין נוסף עלה מהשאלה של שימוש ומודעות לשירותי היעץ השונים. דוברי שפת אם עברית ודוברי שפת אם רוסית כמעט ולא עשו שימוש בשירות, לעומתם דוברי שפת אם ערבית השתמשו בו לעיתים קרובות.

מאמר שני

במאמר השני נעשה שימוש בניתוח תוכן של שני שירותי יעץ וירטואליים מבוססי אינטרנט. בשורות הצ'ט (116 פניות) ובשורות הדואר אלקטרוני- להלן דוא"ל (213 פניות), בספריית יונס וסוראיה נזריאן באוניברסיטת חיפה. עוד שילב המחקר ניתוח תוכן של שאלון פתוח לצוות היועצים (16 עונים) במחלקת היעץ.

תוכן השאלות והתשובות בפניות ליעץ הוירטואלי (בצ'אט ובדוא"ל) נאספו וקודדו, כולל שיוכו האקדמי של הפונה (רק בפניות ליעץ באמצעות הדוא"ל). ניתוח התוכן בוצע על שאלות הפונה ותשובת הספרן. כל פנייה מוינה לפי שלוש קטגוריות; **מי** הפונה, **מה** הוא שאל **וכיצד** נענה. שאלון הספרנים כלל 8 שאלות, בנושא השוואה בין שירותי יעץ וירטואליים לשירותי יעץ פנים מול פנים.

אחד הממצאים הבולטים במחקר היה ששירות הצ'אט אינו עונה על צרכי המידע של המשתמשים. בשורות הדוא"ל, רוב השאלות היו שאלות יעץ נושאיות (שאלות יעץ מעמיק), רוב התשובות כללו רשימה ביבליוגרפית של פריטי מידע הרלוונטיים לשאלה הנושאית. בשורות היעץ בצ'אט, רוב השאלות היו שאלות קצרות. בחלק גדול מהמקרים השאלות לא נענו באופן מיידי, אלא הועברו לשירות יעץ אחר (שירות יעץ פנים אל פנים, או שירות יעץ בדוא"ל). בשאלון הפונה ליועצים, כשנשאלו על ההבדל בין שירותי יעץ וירטואלי ליעץ פנים מול פנים רוב התשובות התייחסו לעובדה שיעץ פנים מול פנים הוא אישי ומותאם יותר לצרכי המידע של הלקוח.

מאמר שלישי

המאמר השלישי מציג ניתוח נתונים של קבצי לוגים ממערכות המידע של הספרייה. הנתונים נלקחו מתוך מערכת המאפשרת קישוריות בין הפרטים הביבליוגרפיים לטקסט המלא (SFX Link Resolver), נתוני כניסה לאתר האינטרנט של הספרייה וקבצי הורדות הטקסט המלא של המוציאים לאור (פרוטוקול COUNTER), עליהם מנוייה הספרייה.

הנתונים נאספו ונותחו, כדי ללמוד אודות התנהגות האחזור והגישה למידע של משתמשי הספרייה. הנתונים נאספו לאורך שלוש וחצי שנים; מינואר 2011 ועד יוני 2014. מתוך כלל הנתונים 18 חודשים נבחרו ונותחו. מניתוח הנתונים עולה שהשימוש בשרותי ההמלצה על פריטים ביבליוגרפיה דומים באותו נושא, נמוך, בהשוואה לשימוש שנעשה במערכת לצורך קישוריות לטקסט המלא באותה תקופה. משתמשי הספרייה מتركזים בקישור לטקסט המלא ומתעלמים משרות ההמלצות המופיע בתחתית המסך. הבקשות לטקסט המלא לפי תיעוד (פרוטוקול COUNTER) המוציאים לאור, גדול ב-3.15 מהבקשות לטקסט מלא שתועדו במערכת הקישוריות של הספרייה (SFX Link Resolver).

מהנתונים עולה שכלי הגילוי של הספרייה אינם מקור המידע העיקרי לצורך גישה לטקסט מלא ולקוחות הספרייה מעדיפים מקורות אחרים כדוגמת Google Scholar. למרות זאת, ניתוח מעמיק וממוקד יותר של הנתונים מצביע על עלייה בשימוש של כלי הגילוי בספרייה, כאמצעי גישה לטקסט מלא.

דיון

בעבודה זו התייחסנו לכל שאלת מחקר בנפרד, לאור הממצאים השונים שעלו. בדיון בשאלת המחקר הראשונה – מהי התנהגות המידע של משתמשי הספרייה, מצאנו שרוב הסטודנטים משתמשים במנועי חיפוש כדי לספק את צרכי המידע שלהם. בתשובותיהם הם העידו שמקורות הספרייה אמינים יותר (ברמתם האקדמית) אבל קשים יותר להתמצאות ושימוש. שאלת המחקר השנייה שאלה היכן מוצאים הסטודנטים את מקורות המידע שלהם. מהנתונים עולה שהם עושים שימוש בעיקר ב-Google Scholar, בנצלם את היתרון שבקישורו למנויי הספרייה, לאחזור טקסט מלא. השימוש במנויי הספרייה מצביע על חשיבותה של הספרייה האקדמית כמספקת מקורות מידע ללקוחותיה, גם אם דרך הגישה אליהם אינה מתוך הספרייה, אלא ממנועי חיפוש. Google Scholar, אינו מעודד שימוש פסיבי בשרותי הספרייה, אולם הוא מקשר את לקוחותיה למקורות המידע המסופקים על ידה.

שאלת המחקר השלישית עסקה בצרכי המידע של הסטודנטים בישראל ובהתנהגות המידע שלהם, לצורך מילוי משימה אקדמית. הממצאים העידו שהתנהגות המידע שלהם דומה לזו של סטודנטים בחלקים שונים בעולם. המחקר חשף כמה הבדלים משמעותיים בין דוברי שלוש שפות האם, עברית, ערבית ורוסית, בהקשר של איתור מידע במקורות הספרייה לעומת מנועי חיפוש באינטרנט.

שאלת המחקר הרביעית בדקה כיצד שרותי היעץ הוירטואלי של הספרייה ממלאים את צרכי המידע של משתמשיה. מהממצאים עלה הבדל בין שרות הצ'אט לשרותי היעץ באמצעות דוא"ל. שרותי היעץ באמצעות דוא"ל נמצאו כמספקים את צרכי המידע של המשתמשים, בעוד ששרות הצ'אט אינו נותן מענה לצרכי המידע של לקוחותיו. שרותי היעץ פנים מול פנים נמצא כשרות המועדף ע"י הספרנים, למרות שהם חזרו וציינו שהשרות הטוב ביותר, הוא זה המתאים לצרכי הלקוח.

מגבלות המחקר

המחקר התבצע באוניברסיטת חיפה והנתונים נאספו מהסטודנטים, מהספרנים וממערכות המידע של הספרייה. ככאלה, הם מייצגים את הסביבה הייחודית של האוניברסיטה ומאפייניה כאוניברסיטה הממוקמת בצפון הארץ ומשרתת בעיקר את תושבי הפריפריה הצפונית, עם הרכב רב תרבותי ייחודי לה. בנוסף, ספריית אוניברסיטת חיפה היא ספרייה מרכזית, בעלת מגוון שירותים ייחודיים ומתקדמים והיא אינה מייצגת בהכרח ספריות באוניברסיטאות ומוסדות אקדמיים אחרים בישראל או בעולם.

המחקר התבצע לאורך שלוש וחצי שנים וממצאיו מתאימים לתקופה זו בלבד. השינויים הרבים והתכופים המאפיינים את תחום הספריות ושירותיהן, כלי החיפוש, מנועי החיפוש, אמצעי התקשורת והסביבות הדיגיטליות של המשתמשים, עלולים להפוך את הממצאים והמסקנות ללא רלוונטיות בעוד שנים ספורות בלבד.

כיווני מחקר עתידיים

ישנם כמה כיווני מחקר אפשריים להרחבת היריעה של המחקר והבנה טובה יותר של התנהגות המידע של לקוחות הספרייה באיתור ואחזור מידע.

המחקר הקיים מתרכז באופן שבו סטודנטים מחפשים ומאחזרים מקורות מידע לצורך כתיבת עבודה אקדמית. באיזה אופן הם מבצעים גישה לטקסט המלא ולאיזה אמצעי תיווך ועזרה הם זקוקים. מחקר המשך מעניין יהיה לבדוק כיצד הם בוחרים את מקורות המידע שלהם ומדוע להערכתם הם בוחרים לעשות שימוש במקור מידע אחד על פני משנהו.

מחקר מקיף יותר צריך להיעשות על תפקידם של הספרנים כמתווכים בין מקורות המידע הזמינים לבין משתמשי הספרייה, באמצעות שרותי היעץ. ניתן יהיה לנתח את שרותי היעץ השונים כולל תצפיות וניתוח תוכן של שרותי יעץ פנים מול פנים יחד עם מתודולוגיה מבוססת ראיונות עומק, כדי ללמוד על סיבות והעדפות של סטודנטים שרות יעץ אחד על משנהו.

עוד מעניין יהיה לבדוק את השימוש שנעשה בממשק החיפוש של הספרייה. ע"י ניתוח לוגים של תהליך החיפוש, יחד עם ניתוח תוכן של שאלות החיפוש, נוכל לקבל נקודת מבט חשובה אודות התנהגות המידע של לקוחות הספרייה.

כדי למצוא את הדרך למקסם את שרות היעץ הוירטואלי באמצעות הצ'אט ובהנחה שבעקבות המחקר הנוכחי נעשו שינויים והתאמות בהתאם למסקנות שנבעו מהתוצאות, נדרש ניתוח תוכן של מפגשי יעץ באמצעות צ'אט מהתקופה האחרונה. הניתוח יתבצע בהתאם לקטגוריות בהן נעשה שימוש במחקר הנוכחי – כדי לבדוק שינוי והתפתחות מגמות נוספות.

מחקר נוסף יכול ניתוח מקיף יותר של נתוני המוציאים לאור. במחקר הנוכחי עשינו שימוש בנתוני הצפייה בטקסט המלא של פריטי מידע, מתוך מנויי הספרייה. במחקר המשך נבקש למצוא מהו המקור ממנו מגיעה הבקשה לטקסט המלא ומאיזו סביבת חיפוש (גוגל אקדמי, אתר המו"ל, מאגר מידע או כל ממשק חיפוש אחר)?

סיכום

הספריות תמיד שרתו כמתווכות בין המשתמשים לבין המידע. טכנולוגיות המידע הזמינות באמצעות רשת האינטרנט הביאו לפריחה של מנועי החיפוש, מקורות המידע והגישה אליהם ללא תלות בזמן או מקום. אימוץ טכנולוגיות חדשות בספריות הביאו לעצמאות והעצמה של לקוחותיה והפך את תהליך החיפוש והאחזור של מידע, נגיש וזמין.

ספריות אקדמיות בסביבה דינאמית ועשירת טכנולוגיות מתקיימות לצד מקורות ואמצעי גישה אלטרנטיביים למידע. עתידה של הספרייה האקדמית תלוי בהיותה רלוונטית למשתמשיה. עבודה זו ביקשה להציע מספר כיווני התפתחות חדשים לספרייה.

במחקר זה נבדקה התנהגות המידע של הדור החדש של משתמשי הספרייה. ילדי הדור הדיגיטלי המיומנים והעצמאים בסביבות הוירטואליות שלהם. העבודה מציגה תמונה מקיפה של שימוש בספרייה האקדמית משלושה היבטים. התנהגות המידע של סטודנטים, מקורות

המידע ואמצעי הגישה של משתמשי הספרייה , התיווך לו נזקקים לקוחות הספרייה באמצעות שרותי היעץ הוירטואלי והשקפתם של נותני השרות – ספרני היעץ.

אין אף כלי חיפוש שיהיה יעיל ומקיף דיו, הן כלי הגילוי של הספרייה והן גוגל וגוגל אקדמי. הכלי הטוב ביותר יהיה זה שנותן מענה לצרכי המידע של משתמשי. מתודולוגיות דוגמת אלה שנעשה בהן שימוש במחקר זה עשויות לאפשר לספריות האקדמיות הבנה טובה יותר של לקוחותיהן והתאמה של כלי החיפוש – בהתאם.

הספריות מודעות לכך שסטודנטים מעדיפים את קלות השימוש בגוגל. אבל הן גם יודעות שכמנוע חיפוש אינו מיצג בהכרח ערכים כמו מהימנות, שקיפות ואמינות. בכך שהספריות מאפשרות למשתמשים לעשות שימוש במנוייהן באמצעות גוגל אקדמי, הן ממשיכות את תפקידן המסורתי כמספקות מידע אמין, איכותי ונגיש ולא בהכרח ע"י שימוש בכלי החיפוש שלהן.

לבסוף, עבודה זו נכתבה מנקודת מבט של חשיבות הספרייה האקדמית בעולם ההשכלה הגבוהה. בגלל תפקידה החשוב באקדמיה, עליה להיות קשובה, ופתוחה לטכנולוגיות חדשות כדי למלא את צרכי המידע ולהתאים שרותיה להתנהגות המידע של המשתמשים.

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הבעת תודה

עבודה זו לא היתה יוצאת לאור ללא תמיכתם של בני משפחתי היקרים. בראש ובראשונה לעמי בעלי, בן זוגי וחברי הטוב ביותר - שעודד, דירבן, פירגן ואיפשר שעות רבות של מחשבה וקתיבה.

לאסף, יובל ויואב בני האהובים, שהבינו, עזרו, התגאו ותמכו בי מכל הלב.

לאבי היקר והחכם ניצול השואה, שנאלץ לעזוב את לימודיו בכיתה ד' ולהתמודד עם מסכת ייסורים כילד וכנער – הרבה מהעבודה הזו היא בשבילך, כי לך לא היתה האפשרות לעשות את זה!

לצוות הספרייה באוניברסיטת חיפה, על הרצון, הפרגון ושיתוף הפעולה.

לאנשי המחלקה ללימודי מידע באוניברסיטת בר אילן. לצוות האקדמי והמנהלי על העידוד, המקצועיות, הרצון הטוב והתמיכה – הייתם לי כ"בית שני" לאורך כל שנות הלימודים.

ולבסוף, למנחה המקצועית והמיוחדת שלי פרופסור יהודית בר אילן שהתמידה, עודדה, נתנה לי השראה ולימדה אותי כל כך הרבה.

היו ברוכים

ריקי, דצמבר 2016

עבודה זו נעשתה בהדרכתה של פרופ' יהודית בר אילן

מן המחלקה ללימודי מידע של אוניברסיטת בר-אילן.

התנהגות המידע של לקוחות הספרייה האקדמית – חקר מקרה של אוניברסיטה בישראל

חיבור לשם קבלת התואר "דוקטור לפילוסופיה"

מאת:

ריקי (רבקה) גרינברג

המחלקה ללימודי מידע

הוגש לסנט של אוניברסיטת בר-אילן

כסלו תשע"ז

רמת גן