

**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 fulfill 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 (Zafir, 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 (Ayris, 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



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

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ABSTRACT

Students turn to a variety of sources when searching for information for their academic assignments. This study uses findings from a survey given to 151 Israeli students attending a university in Israel. A questionnaire comprising 12 questions was administered regarding their information needs, information behavior, and difficulties in searching and writing an academic assignment. A special emphasis of the study was on the multicultural environment of the Israeli students and its effect on their information behavior. Results show that there is a significant difference between native language groups with regard to the use of search engines, the use of library services, and in the patterns of conducting their academic assignment. The findings imply that when the language of instruction and assignment delivery is the students' second language, they have special needs and should receive particular attention from the library and information services.

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INTRODUCTION

Studies indicate that 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. For students, the Internet allows access to a rich store of readily available materials that can be cited in a manner similar to the more conventional sources, such as books and academic journals (Biddix, Chung, & Park, 2011; Metzger, Flanagan, & Zwarun, 2003; Radia & Stapleton, 2008). There is growing concern among higher education professionals regarding how students' information search and retrieval skills are negatively influenced. Easy access to digital information raises concerns related to whether students put forth the effort expected of them and if they know how to find scholarly resources that measure up to academic assignments (Denison & Montgomery, 2012).

Using an information behavior questionnaire, the goal of this study is to describe how Israeli students from the university of Haifa study conduct research, and find information. We asked about their needs, strategies, and preferred use of information sources for academic assignments, what difficulties they encounter with course-related research from start to finish, and how students evaluate the information they choose to use. We also tried to understand how students from

different native language groups from varied cultures and backgrounds seek information, the differences in their information behavior, and their difficulties in overcoming language barriers.

LITERATURE REVIEW

Given the prevalence of literature in the field, we have chosen to discuss the literature selectively. Studies conducted over the last decade indicate that for their academic assignments, students tend to use Internet search engines more than searching library resources (Currie, Devlin, Emde, & Graves, 2010; De Rosa, Cantrell, Hawk, & Wilson, 2006; Graham & Metaxas, 2003; Jones & Madden, 2002; Kim & Sin, 2007; Metzger et al., 2003; Thompson, 2003). 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 (Lee, Paik, & Joo, 2012). Accessing library resources takes much more time and is therefore reserved for larger projects such as research assignments. Accessing information on the Web is much faster, and although it may be less reliable and credible, it offers students the answers they need to review information quickly (Biddix et al., 2011; Jones, Johnson-Yale, Millermaier, & Pérez, 2008).

Students tend to save themselves the effort of dealing with the library's discovery tools and databases. We cannot be sure whether they choose to do so because other sources are more convenient to use, or because they lack the necessary literacy skills (Thompson, 2003). According to Niu et al. (2010), research students use citation or bibliographic databases as their first source, while their second choice is Web search engines like Google or Yahoo, but they specifically added that the library databases are not user friendly or easy to work with (Niu et al., 2010).

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In most previous studies, most of the students are young in age (in their early 20's) and define themselves as savvy Internet users. However, they conduct basic shallow searches in natural language and do not spend time locating keywords or using effective search strategies. They often conclude the search without having retrieved the best quality resources (Rowlands, Nicholas, Williams, Huntington, & Fieldhouse, 2008; Williams & Rowlands, 2007). Most of the students define themselves as qualified in searching for information; they are satisfied with their searches; they learn from their own experience and do not need any instruction. Yet some noted that they cannot find the precise academic information for their needs and view the process of searching for information as laborious but necessary (Denison & Montgomery, 2012; Gross & Latham, 2007; Head & Eisenberg, 2010a, b; Niemand, 2010).

The age of the students as an influencing factor has been studied extensively but the findings are inconclusive. Some results indicate (Graham & Metaxas, 2003) that older students do not perform better searches than their younger peers – they rely on the sources of information found on the Internet and do not check their credibility – while other studies (Eshet-Alkalai, 2004; Gratch-Lindauer, 2007) indicate that older students have the ability (and experience) to choose more reliable sources and to critically examine the information they retrieve.

The students report that the main difficulties in carrying out their academic assignments are to begin work, to define the research subject, to choose and evaluate the information source, and to understand their professor's requirements (Head, 2008). However, the results of Head's study indicate that the most dominant factors in students' information behavior are their tight schedules and lack of time. They decide to finish their search when the time set aside for the assignment ends or when, in their opinion, they have spent enough time on the task in comparison to the credit they receive for it. They are driven by efficiency, and have a consistent method of working that allows them to find their way around the information overload to which they are exposed when they search for information for an assignment. This fact may result in them using a limited number of the same "permanent sources" for all their assignments (Head & Eisenberg, 2010a,b; Prabha, Connaway, Olszewski, & Jenkins, 2007; Urquhart et al., 2003).

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 differences in quality of research literature and are familiar with scholarly searches of electronic sources, they continue to cite inferior sources (Radia & Stapleton, 2008; Stapleton, 2005).

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" (Multicultural, n.d.). In this survey we refer to students coming from diverse cultures and linguistic backgrounds as "multicultural society students". In Israel there are some major ethnic groups, including Israeli-born Jews, Israeli-born Arabs, and immigrants. One of the largest immigrant groups is from the former Soviet Union (Central bureau of statistics, 2012). These groups differ in the first language they use; Hebrew, Arabic, and Russian, respectively.

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 searching 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 (social class and religious differences). The international students show a stronger

interest than the American students in reference instruction/ orientation/workshops and reference (Liao et al., 2007). International students are described in the literature as having fairly good information skills but they find it hard to use them due to the linguistic and cultural aspects of their information use (Hughes, 2009). Mehra and Bilal (2007) claim that foreign language students lack awareness of the multiple language interfaces provided by Google, and of foreign language resources available on the Web (Mehra & Bilal, 2007), while other studies indicate that they prefer to use their native language web sites (Caidi & MacDonald, 2008; Srinivasan & Pyati, 2007).

ISRAELI STUDIES

In Israel, several studies have been published on the usage patterns, literacy, and information needs of the Israeli students. In two studies of Israel college students (Avidgiori, 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 another study (Mizrachi & Shoham, 2004) on students studying in teaching colleges, there was a correlation between information and computer technology expertise and English language information sources usage. In a study of Israeli nursing students (Zafir, 2011) a correlation was found between English language proficiency and information search and usage. Furthermore, the Arab students found it more difficult to use keywords and search strategies in English, as it is their third language. In their study about information seeking behavior of Arab students in a teaching college, Chai & 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.

MAJOR ARTICLES ADDRESSED IN THE DISCUSSION

In our study we specifically mention three recent studies on the information behavior of students. Head and Eisenberg (2010a, 2010b) conducted a large-scale survey of college students from twenty-five US campuses as part of the US "Project Information Literacy". They received 8353 responses and their survey concentrated on information seeking strategies and research difficulties. The major findings relevant to the current study were the use of the same information sources for all the academic assignments. The most difficult stages in the process of preparing the assignment were beginning the assignment, defining the subject, and narrowing down their search results. In the search process the most difficult task was searching the library databases. The most important factors for the American students in this survey were passing the course, finishing the assignment, and getting a good grade; although many of them also declared their desire to find the course interesting and learn something new.

Niemand (2010) explored the information seeking behavior of 289 knowledge information students from the University of Johannesburg, South Africa, through a questionnaire. The major findings relevant to the current study were that the respondents met their information needs by utilizing the Internet as their primary source. The majority of the respondents indicated that they used search engines to find relevant information for their tasks and only 20% declared using the library as their source of information. Most of the respondents indicated that their basic Internet usage skills were gained through self-exploration.

Lee et al. (2012) used a self-generated diary method to investigate how 233 undergraduate students coped with their academic search tasks at the Yonsei University in Seoul, Korea. The major findings

relevant to the current study were that the students used search engines as their most frequently used sources of information and they used them to begin search tasks. The participants used Wikipedia and online databases to find further information. In particular, they clicked on hyperlinks offered by Wikipedia to extend their search topics.

RESEARCH QUESTIONS

We study the selection of information sources and associated factors in undergraduate and graduate students' search tasks by addressing the following research questions:

- 3.1 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 for researching their academic assignments?
- 3.2 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?
- 3.3 What are the most difficult stages for students when preparing an academic assignment?
- 3.4 How do students acquire their information skills?

METHODOLOGY

The survey was conducted during the second semester (spring) of the 2012 academic year, at Haifa university, Israel. A call for the survey was sent out to selected lecturers (who collaborated in the past with library initiatives) from eighteen departments covering all six faculties of the university.

Ten lecturers from four faculties were willing to participate.

The questionnaire was administered to the students in courses selected by the lecturer, during class time.

This 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 closely reflect data from the Israeli Central Bureau of Statistics (CBS, 2011). In terms of gender, 54 (38%) of students were male and 89 (62%) students were female.

The questionnaire comprised twelve questions: closed questions (some multiple choice and some Likert scale), partially open, and open questions (see Appendix). The questions were designed to answer the research questions.

The questionnaires were anonymous, but we asked the students to provide demographic details to enable a deeper analysis.

RESULTS

We surveyed 151 students from four different faculties. Since there were no statistically significant differences between the students in the various faculties or age groups we chose not to present an analysis based on the faculties or age. In this paper we specifically concentrated on the differences due to the native language of the respondents. The statistical tests compared more than two independent groups on continuous variables using the Kruskal–Wallis test, and compared between two independent groups on continuous variables using the Wilcoxon Scores (Rank Sums) test.

The most difficult stage of the course-related research process for the Israeli students was getting started, chosen by 33 students (23%). The second most frequently mentioned step writing, was picked by 19 students (13%), followed by finding articles from databases, chosen by 15 students (11%), and choosing relevant sources from the information found, mentioned by 14 (10%). The most frequently chosen easiest part finding information in search engines, was picked by 40 students (29%) and defining the research subject, mentioned by 18 students (13%).

We asked specifically about the sources they used for their most recent assignment (each student mentioned a few sources). Here, the students mainly mentioned articles (99 students, which is 66% of the total students in the survey), books (67 students, 44% of the students in the survey), and Web resources (58 students, 38% of the students in the survey). For their most recent assignment, they searched (each student mentioned a few sources) on the Internet, including search engines and web resources (162), and the library resources (109). These two questions were open questions, for which each student specified a list of resources.

When searching for information for an academic assignment, the students indicated the Internet (search engines, 101 students (67%) and Google Scholar, 84 students (59%)) as their primary source of search. See Table 1.

We found a significant difference (p value = 0.0184) between native language groups with regard to the use of search engines. The difference was between native Hebrew and native Arabic language students (p value = 0.0096) [mean score of 3.91 ± 1.20 (median 4.00 – Hebrew) and 3.24 ± 1.32 (median 3.00 – Arabic) respectively]. There was a difference also between the native Russian and native Arabic language groups (p value = 0.0415) [mean score of 4.18 ± 1.08 (median 5.00 – Russian) and 3.24 ± 1.32 (median 3.00 – Arabic) respectively].

We also found a significant difference between the native language groups regarding the “ask a librarian” services (p value = 0.0314). The significant difference was between native Hebrew and native Arabic language speakers (p value = 0.0097) [mean score of 2.37 ± 1.22 (median 2.00 – Hebrew) and 2.94 ± 1.09 (median 3.00 – Arabic) respectively].

Most of the participants used library sources together with Internet search engines to meet their information needs. Thirteen students (9%) used only library resources, 92 (61%) used library resources with Web resources, 24 (16%) did not use library resources, and 21 (14%) indicated that they chose according to the assignment. 58 undergraduate students

Table 1
Sources used to gather information for an academic assignment.

Sources	Not in use	Small degree	Medium degree	High degree	Very high degree	Frequency missing
Course reading	12 (8%)	38 (26%)	35 (23%)	53 (36%)	11 (7%)	2
Search engines	8 (5%)	21 (14%)	21 (14%)	44 (29%)	57 (38%)	
Wikipedia	28 (19%)	34 (23%)	27 (18%)	32 (21%)	29 (19%)	1
Library web site	13 (9%)	20 (13%)	26 (17%)	43 (28%)	49 (32%)	
Google Scholar	15 (10%)	12 (8%)	32 (22%)	33 (23%)	51 (36%)	8
Ask a librarian	40 (27%)	46 (30%)	31 (21%)	21 (14%)	12 (8%)	1
Ask a teacher	16 (11%)	56 (37%)	46 (31%)	19 (13%)	12 (8%)	2
Classmates	18 (12%)	44 (30%)	35 (24%)	36 (24%)	16 (11%)	2
Social web	95 (63%)	29 (12%)	14 (9%)	8 (5%)	4 (3%)	1
Ready assignments web sites	99 (67%)	29 (19%)	7 (5%)	9 (6%)	4 (3%)	3

Table 2
Frequency of using content parts in the library home page.

Content parts in library web site/extent of use	Very small	Small	Medium	High	Very high	Freq. missing	Rank based on extent of use (high and very high)
Search box	29 (20%)	(17%)	(20%)	(26%)	(17%)	3	4
Databases	15 (10%)	22 (15%)	38 (25%)	44 (29%)	31 (21%)	1	3
Information on services	60 (41%)	36 (24%)	24 (16%)	18 (12%)	9 (6%)	4	7
Reference	55 (37%)	35 (23%)	31 (21%)	16 (11%)	12 (8%)	2	6
Opening hours	97 (66%)	27 (18%)	15 (10%)	3 (2%)	6 (4%)	3	8
Refworks	112(76%)	20 (14%)	10 (7%)	1 (1%)	3 (2%)	5	9
Remote access	49 (33%)	30 (21%)	27 (18%)	24 (16%)	16 (11%)	5	5
Highlearn	22 (15%)	8 (5%)	13 (9%)	44 (30%)	62 (42%)	2	1
Citation finder	23 (16%)	15 (10%)	24 (16%)	55 (38%)	29 (20%)	1	2

(55%) and 39 graduate students (71%) chose the option of library sources together with web sites.

When asked about using the different content parts in the library web site, the students indicated that they usually use the link to Highlearn (the university course portal) followed by citation finder, databases, and the library's search engine, based on the selection of high or very high extent of use (see Table 2).

We found a significant difference (p value = 0.0009) between native language groups with regard to the "information about the library" section. The significant difference was between native Hebrew and native Arabic language students (p value = 0.0002) [mean score of 2.00 ± 1.20 (median 2.00 – Hebrew) and 2.97 ± 1.30 (median 3.00 – Arabic) respectively]. Also, in the native Russian and native Arabic language groups (p value = 0.0335) [mean score of 2.00 ± 0.89 (median 2.00 – Russian) and 2.97 ± 1.30 (median 3.00 – Arabic) respectively].

We found another significant difference (p value = 0.0016) between the native language groups in regard to the "Reference services" section. The significant difference was between native Hebrew and native Arabic language students (p value = 0.0003) [mean score of 2.08 ± 1.16 (median 2.00 – Hebrew) and 3.03 ± 1.33 (median 3.00 – Arabic) respectively].

The results showed that 133 students in the study perceived the library sources as trustworthy (92%): 69 of them (48%) said the library resources are highly trustworthy, while 64 students (44%) thought that the library resources are very highly trustworthy.

When the students were asked to describe their pattern of work, 108 (75%) of them declared that they tend to use the same information sources in all the assignments; 68 (47%) of them to a high extent, and 40 (28%) of them to a very high extent. The second pattern declared as central in their work by 89 (61%) students is looking for English keywords: 50 (34%) to a high extent and 39 (27%) to a very high extent. The next popular option chosen by 84 (58%) students was looking for Hebrew keywords: to a high extent 49 (34%), to a very high extent 35 (24%). See Table 3.

We found a significant difference (p value = 0.0163) between the native language groups in the section "finishing the assignment after finding the minimum number of resources". The significant difference was between the native Hebrew and native Arabic language groups

(p value = 0.0070) [mean score of 2.66 ± 1.12 (median 3.00 – Hebrew) and 3.22 ± 1.13 (median 3.50 – Arabic) respectively].

We found another significant difference (p value = 0.0071) between native language groups in the section "Using English keywords". The significant difference was between native Hebrew and native Arabic language students (p value = 0.0022) [mean score of 3.72 ± 1.20 (median 4.00 – Hebrew) and 2.90 ± 1.30 (median 3.00 – Arabic) respectively].

In writing their assignment, the most important factor for 133 (90%) of the students was to get a good grade. Passing the course (121 – 83%), finishing on time (124 – 86%), and meeting the requirements (122 – 84%) were all equally important. Learning something new was important only to 84 (68%) of the students. See Table 4.

The students were asked about the way they acquired their academic search skills. The majority (66 students, 46%) learned by themselves, and 20% (29) of them participated in instruction organized by the library or their department. Only 6% (9) learned from their friends and family members. 12% (17) mentioned both organized instruction and independent learning. The detailed distribution of the answers to this question is displayed in Table 5.

DISCUSSION

This study of Israeli students yields very similar results to recent studies published in the literature, although we observed some differences due to multicultural characteristics that are discussed below.

In our discussion we specifically address three recent studies on the information behavior of students. In their study, Head and Eisenberg (2010a, 2010b) examined the information seeking strategies and research difficulties of American students. Niemand (2010) explored the information seeking behavior of South African students, and Lee et al. (2012) studied Korean students from a university in Seoul, in achieving their academic search tasks.

Like the American students, the most difficult stage of the course-related research process for the Israeli students was getting started. The second step was writing, and the next two steps mentioned were finding the relevant information from the search results and extracting the relevant information for their assignment, as also declared by the

Table 3
Patterns in conducting an academic assignment.

Patterns in conducting an academic assignment/extent	Very small	Small	Medium	High	Very high	Frequency missing
When I have found the number of sources requested by the lecturer, I stop searching	27 (19%)	26 (18%)	50 (34%)	32 (21%)	11 (8%)	5
If I cannot find the required sources in one or two searches, I try to change the subject	23 (16%)	47 (33%)	42 (29%)	20 (14%)	12 (8%)	7
To start a search, I look for keywords or basic search terms in Hebrew	12 (8%)	23 (16%)	26 (18%)	49 (34%)	35 (24%)	6
To start a search, I look for keywords or basic search terms in English	12 (8%)	25 (17%)	19 (13%)	50 (34%)	39 (27%)	6
I tend to use the same information sources for all my assignments	4 (3%)	4 (3%)	29 (20%)	68 (47%)	40 (28%)	6
I try to pick a similar subject for different assignments to save time	31 (21%)	53 (37%)	34 (24%)	17 (12%)	10 (7%)	6
I spend the same amount of time on each assignment	40 (28%)	38 (26%)	39 (27%)	13 (9%)	15 (10%)	6

Table 4
Important factors in writing an academic assignment.

Important factors in writing an academic assignment	Very small degree	Small degree	Medium degree	High degree	Very high degree	Freq missing
Good grade	3 (2%)	2 (1%)	9 (6%)	43 (29%)	90 (61%)	4
Pass the course	6 (4%)	8 (5%)	11 (8%)	48 (33%)	73 (50%)	5
Finish on time	3 (2%)	2 (1%)	16 (11%)	44 (30%)	80 (56%)	4
Meet the required scale	2 (1%)	6 (4%)	16 (11%)	54 (37%)	68 (47%)	5
Learn something new	5 (3%)	8 (6%)	33 (23%)	49 (34%)	49 (34%)	7

American survey. Finding information on the web was the easiest stage for Israeli students in our study and also for the American students according to the PIL survey (Head & Eisenberg, 2010a,b). The students 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. This behavior is similar to the South African students' way of meeting their academic information needs by utilizing the Internet as a primary source (Niemand, 2010) and to the Korean students who mentioned the search engines Google, Naver, and Daum as the most frequently used sources of information (Lee et al., 2012). Only a few students in our sample used Web 2.0 applications – a finding that matched the results of the PIL survey of American students (Head & Eisenberg, 2010a,b). Israeli students thought that the library sources are trustworthy. This finding was similar to the American students' study findings, who believed that library sources require less evaluation than information posted by anyone on the open-source Web sites (Head & Eisenberg, 2010a, 2010b). Unsurprisingly, like the American students, what mattered most to students while they were working on course related research assignments was passing the course, finishing the assignment, getting a good grade, and complying with the assignment requirements.

Our findings show that both undergraduate and graduate students gained their academic search skills through self-exploration. This statement corresponds with the results obtained from the South African respondents. It can be explained by the fact that as the students interact with the digital environment in their daily life, they do not need comprehensive instruction on using or interacting with technology and they tend to learn by exploration (Niemand, 2010) (Table 6).

DIFFERENCES IN A MULTICULTURAL SOCIETY

Our 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. Both the Arab population and the Russian population need to cope with three languages: their native language, Hebrew – the language commonly spoken in the university – and English, which is the academic research language. The problem of coping with a second language for the majority of the Israeli students is hereby intensified for the students whose native tongue is Arabic or Russian.

We saw significant differences between these three groups in their responses to several questions. When the students were asked about their preferred method of information retrieval, 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. This may be explained as the Arab-speaking population probably has more difficulty using English language sources and keywords (2013 Chai & Shoham, 2012; Zafrir, 2011). The findings that the Russian immigrants use search engines, despite the fact that they are a “third language population” and have an English proficiency problem, may be because they used their Russian language search engines and information sources. However this issue was not explored in the survey. This behavior is described in the literature as an online “E-Diaspora” phenomenon, suggesting that immigrants – both newcomers and longer established immigrants – have transnational identities in an online environment that have an effect on their information needs.

Table 5
Distribution of answers to the question: how did you acquire your academic search skills?

Acquiring academic search skills	Organized instruction	By self	Organized instruction & self-learning	Friends and family	Instruction + friends and family	Friends and family + self	Friends & family, self + organized instruction	Freq. missing
Total	29	66	17	9	1	5	9	7
Percentage	20%	46%	12%	6%	0.7%	3%	6%	

Table 6
Comparison of the four studies.

Issues	Israeli students	American students	South African students	Korean students
Most difficult stage of preparing an academic assignment	Getting started Writing	Getting started Writing		
Easiest stage of preparing an academic assignment	Finding information on the Web	Finding information on the Web		
Primary search source of preparing an academic assignment	Internet search engines Minimal use of Web 2.0	Minimal use of Web 2.0	Internet search engines	Internet search engines
Library sources	Trustworthy	Trustworthy		
What matters most when preparing an academic assignment?	Passing the course Finish on time Good grade Complying with the requirements	Passing the course Finish on time Good grade Complying with the requirements		
Search skills	Self exploration		Self exploration	

They tend to use their home countries' native web sites or sites that are tailored to groups belonging to a particular cultural group or religious affiliation (Srinivasan & Pyati, 2007; Caidi & MacDonald, 2008).

Another interesting 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 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 et al., 2007). Since this population seemingly has a problem with English language proficiency (Zafirir, 2011n.d.), the library staff need to inform the students about the reference services and how to use them. They need more encouragement to use reference services (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.

We asked the students about their use of library resources for academic assignments, and saw interesting differences between the three language groups. The Russian immigrants were the "heaviest" users of the Web as an information source, both in conjunction with library resources (55%) or using only Web resources (36%). Again we can relate this finding to the phenomena of tending to use their home countries' native web sites and having their own virtual native identity, enabling them to make less use of the information sources (in English and in Hebrew) of the library. Similar results emerged from the question relating to the use of content parts on the library's home page. When asked about the use of a citation finder in the library web site, all three populations indicated a high use of this option. This can imply that the Russian immigrant population may do its searches on the web but in order to retrieve the full text of an article they use the library web site.

Both content parts of information about the library services and reference services via the library web site were frequently used, with statistically significant differences by the Arab native language population on average when compared to the Hebrew and Russian native language groups who reported low use. This can be explained as they are more familiar with all the services and the options offered by the library (Liao et al., 2007) than the native Hebrew speakers.

When asking the students if they finish researching their assignment once they have found the minimal number of sources indicated by the lecturer of the course, once again we found that the Arab native language group differed significantly from the other two population groups. They were more likely to conclude their research after finding the minimum resources. This can be explained by their language difficulties in dealing with academic literature (Chai & Shoham, 2012; Zafirir, 2011n.d.).

All three language groups used the same information sources for every assignment. 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 have to find (Stapleton, 2005; Radia & Stapleton, 2008).

STUDY LIMITATIONS

Our 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.

CONCLUSION

The purpose of this study is to describe how Israeli students conduct research and find information. 151 students from different faculties answered a 12-question survey in class.

- 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 respondents tend to use the same information sources for every assignment.
- They use English and Hebrew keywords to conduct their search.
- When writing their assignments, the most important factor is the grade. Other important factors are passing the course, finishing on time, and meeting the requirements
- The students acquire their search skills by themselves. Only a minority of them received any instruction.
- Due to the multicultural environment in Israel in general and in our survey in particular, we found significant differences between the different native language groups (Hebrew, Arabic, and Russian) concerning use of search engines, English keywords, and library services.

RECOMMENDATIONS

The study focuses on how the Israeli students perform their academic tasks. Due to the multicultural differences of the student population, special services should be offered to the different native language student groups; from intermediary services for search strategies, information use and retrieval, to special instruction, given in their own native languages.

The libraries should be aware of the special information needs and attend to those needs so that the students will be able to better use the library services and effectively fulfill their information needs.

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



“Ask a librarian”: Comparing virtual reference services in an Israeli academic library



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ABSTRACT

This study considered two Web-based virtual reference services (VRS) at an academic library in Israel: chat (116 interactions) and email (213 exchanges). The contents of a set of questions and answers in both VRS services were analyzed, along with an open-ended questionnaire administered to the library's reference team ($n = 16$). Differences were found in the question and answer distributions. Face-to-face reference is preferred by the librarians although they acknowledge that the best fitting service is dependent on the users' preferences and their information needs.

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1. Introduction

Academic libraries of the 21st century try to meet the information needs of their patrons using a variety of online services. Among these services, libraries provide web-based virtual reference services (VRS) as alternatives to traditional face-to-face (f2f) reference (Radford & Connaway, 2007). This study analyzes the virtual reference (VR) services at the library of the University of Haifa. This library offers several types of reference services, including chat, email VR, f2f, phone, and workshops. The reference librarians need to handle multiple working environments in order to satisfy their users' information needs.

2. Problem statement

Very few studies have compared different types of VR services, and none has supplemented such a comparison with librarians' impressions about these services as compared to f2f reference. As reference services become more remotely enabled, patrons are less “visible” to reference librarians, and yet little is known about the impact of this difference in interpersonal interaction in this context. An informed understanding of VR services would enable libraries to have more insights into the information behavior of patrons using VRS and to adjust accordingly in order to improve patrons' VRS experiences. It is important to know whether patrons fulfill their information needs in the chat VR services, and if not, why not. This study explored how the VR services chat and

email were used, and how they compared to the more traditional f2f service, and was guided by the following questions:

- 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 f2f and VR reference services?
- What is the librarians' attitude towards the VR services?

3. Literature review

3.1. Virtual reference services in libraries

Starting in the mid-1980s, libraries have been using VRS, which enable library patrons to receive help with information queries online (Christopherson, 2011). Responding to user demand and technological trends, libraries now routinely provide web-based virtual reference services (VRS) as alternatives to traditional face-to-face (f2f) reference (Radford & Connaway, 2007; Shachaf & Horowitz, 2008). The Reference and User Services Association (RUSA) (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).

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3.1.1. What is virtual reference?

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 which allowed users to send questions to reference librarians and receive a response, usually within 24 h and often much more quickly (Lee, 2004). In the late 1990s the term VR (virtual reference) began to be used (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 reference librarians. During 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 traditional f2f interaction to a virtual interaction where conversational moves are sometimes unclear and nonverbal communication signals are missing (Christopherson, 2011). Dialogues in instant messaging (IM) for example (e.g., chat), should be short because the recipient experiences long waiting time while messages are being 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 (RUSA, 2010; Thomsett-Scott, 2013). 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).

3.1.2. Use of VRS

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). Owing to the nature of VRS, the patrons get less instruction and training (Steiner, 2011). Due to the type of interaction in the f2f reference service, the librarian can visually demonstrate search strategies and skills. In virtual reference, however, it is challenging to create and recognize teachable moments, and patrons get less instruction and training (Steiner, 2011).

3.1.3. Patrons and preferences of VRS

In academic libraries, virtual services serve all patrons. Faculty as well as students embrace electronic resources and services to varying degrees (Moyo, 2004). User preferences are shaped by several factors (Nicol & Crook, 2013), 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 that user preferences are also linked to their age and the kind of research in which they are involved. Some studies (Nicol & Crook, 2013; Connaway & Radford, 2010) found that students, who are typically comfortable in the online environment, are likely to find chat both convenient and familiar.

3.1.4. Questions in VRS

Studies show that VR services (mostly via email) receive a large percentage of research questions which are similar to the types of questions asked at physical reference (Fennewald, 2006; Foley, 2002; McCulley & Reinauer, 2007). Fennewald (2006) found that the majority of questions in VRS were considered "reference," whereas the majority of questions at reference desks were "directional" (p. 27). Sears (2001), Houlson, McCready, and Pfahl (2007) and Hanz and Lange (2013) specifically analyzed the types of questions asked in online chat reference. Unlike Fennewald (2006) they observed that a minority of the questions were research-based while the remaining related to policy, procedures, resources, directions, ready reference, or technical matters.

3.2. Information seeking behavior

Transactions at the reference desk (physical and virtual) reflect the information seeking behavior of students and faculty at an academic institution (Finnell & Fontane, 2010). 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 preferences. Library users attempt to minimize the overall work associated with their information needs. Young and Von Seggern (2001) found that time spent in locating information and convenience of use were significant factors in information seeking behavior, regardless of patron's academic status. Information seekers have a lot of options and little time, and use many different types of communication tools. Libraries are trying to embrace the challenge of meeting the needs of their users (Chow & Croxton, 2012).

3.3. Millennials' information needs

Members of the millennial generation (also known as the net generation, screenagers, or digital generation) were born between 1979 and 1994 (Connaway, Radford, & Williams, 2009). These patrons tend to be results-oriented and practical when looking for information. They want easy access to full-text documents (Radford & Connaway, 2007) and become impatient with complex searching that yields only citations or abstracts. They expect 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. Millennial generation students comprise the largest cohort of today's academic library users and pose a special challenge for information service development (Connaway et al., 2009). Millennials feel at home in virtual environments. Meeting patrons on their own turf may strengthen a library's presence and help advertise what librarians can do for information-seeking users (Christopherson, 2011).

4. Methodology

This study used a mixed quantitative and qualitative method for analyzing the virtual reference transactions at the University of Haifa's library. Two VR services were studied: email and chat. In addition, a comparison was made between the results and reference librarians' answers to the open-ended questionnaires. Virtual reference transactions that occurred during December 2012 were analyzed, and the reference librarians were surveyed in October 2013.

4.1. Sample

The study included all transactions using email (213 exchanges) and chat (116 interactions) that occurred during December 2012. The content of 10% of the reference sessions was analyzed by two coders. The inter-coder reliability was 91%. The library's reference staff ($n = 16$,

70% response rate) filled in an open-ended questionnaire in October 2013.

4.2. Question classification

Transcript analysis and categorization is useful for examining several aspects of virtual reference services such as quality of an answer, correctness of an answer, interpersonal communication, and adherence to appropriate reference guidelines (Burger et al., 2010). Various systems of categorization are used to evaluate reference questions; the work of the following scholars helped to form the basis of the classification used in this study. Mann (1998) distinguished between “reference questions” as ready-reference questions and “research questions” which can be more time consuming. Schwartz (2004) used a typology that considered *who* the patron was, *what* he was asking, and *how* the library staff processed the answers. The “how” category could be answered by either answers or referrals. In the “what” category the questions were grouped into reference, non-reference, and known item. In her 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.

For this study, each reference interaction was classified according to *who* was using the service, *what* the patrons were asking (Table 1), and

how the questions were answered (Table 2), using categories and sub-categories information by Mann (1998), Moeller (2004), and Schwartz (2004).

4.3. Instrumentation and protocol

The VR data were collected and coded (using Excel data sheets), including patron affiliation (only for email sessions). Classification codes were given both to questions and answers.

The library’s reference staff questionnaire was composed of eight questions regarding VR services in comparison to face-to-face reference (see Appendix A). The categorization and the distribution of the questions and answers were presented to them and they were asked 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 better suited the library’s patrons in their mind. They were also queried about the main differences between VR and physical reference services.

4.4. Analysis

Content analysis (Neuendorf, 2002) was applied to the patrons’ questions and to the librarians’ answers in both email and chat services. Both authors analyzed the content of 10% of the VRS interactions (email and chat). There was 90% agreement on the categorizations. The rest of the VRS interactions were analyzed by the first author. The librarians’ answers to the open-ended questionnaire were compared with the results of the content analysis.

Table 1

Question types: Content categories and subcategories.

Categories	Subcategories
In-depth questions	<ul style="list-style-type: none"> • Questions on a specific subject A “classic” research question, request for items in 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 in 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 composed of only freely accessible (for library patrons) electronic full text items • Hebrew items in a specific subject Request for bibliography of Hebrew items on a specific research question
Short and quick answers questions	<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, reserve an item from the catalog, question about fines, etc. • Citation rules How to cite a bibliographic item according to citation rules of the American Psychological Association (APA) or the Modern Language Association (MLA), etc. • Reference manager Options to open an account, instruction and support for Refworks or Endnote • Miscellaneous short questions
Instruction	<ul style="list-style-type: none"> • Technical support Access problems to library resources or subscriptions • Remote access General instructions or passwords problems • Database tutorials Request for instructions or tutorials on a specific database or feature
Policy	<ul style="list-style-type: none"> • General information about library services.

Table 2

Answer types: Content categories.

Answer types	Explanation
Bibliography lists sent to the patrons	The patron will receive a detailed bibliography according to her request (books, articles, Hebrew items, full text articles, etc.)
Tutorial and screen shots for explanation	The librarian will send detailed instructions attaching a tutorial or a screenshot to illustrate the explanation
Forward to another service	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.
Full text items	Attachment of an electronic version of an article or a link to it
Informative answer	The patron will be advised on 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”).
Link to Google Scholar search results	The librarian will perform the search according to the user’s information needs. She will send the patron a link to the Google scholar search results, for review and selection.
No answer	The librarian failed or cannot answer the patron’s question (e.g., cannot find an electronic format of a certain book).
Clarification	The librarian needs more details in order to answer the question (e.g., “There are thousands of theories on x. Please provide specific date range or authors”).
Partial answer	The librarian can only answer part of the question asked (e.g., found only one item, cannot seem to find the other title mentioned).
Keywords	The patron is given keyword suggestions for a search (e.g., “You can use the words xyz in your search”).

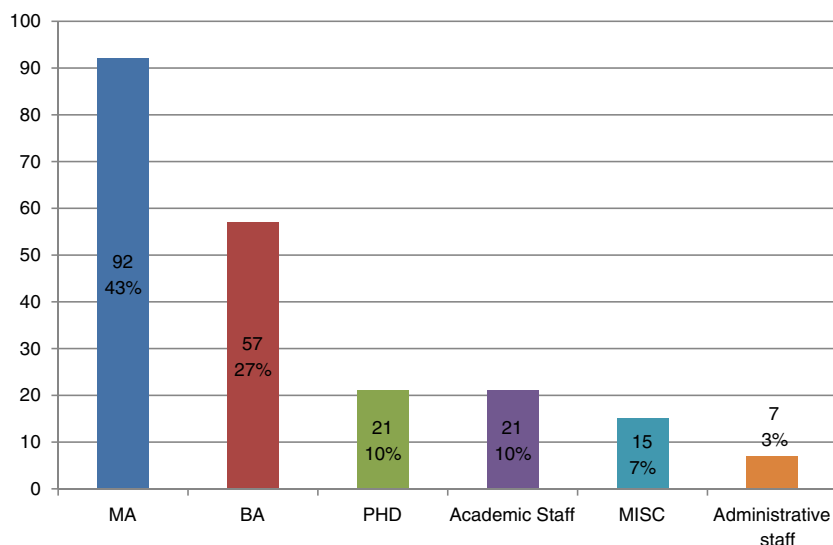


Fig. 1. Users of VR email service, by population type.

5. Results

5.1. Virtual reference by email

The library offers email reference service on its “Ask a Librarian” section on the library home page. During December 2012, 213 VR questions were submitted via email. The contents of the questions and the answers were analyzed according to the *who*, *what*, and *how* categories described in the previous section.

In the “*who*” section a total of 213 users were categorized into six types (Fig. 1). The most frequent users of the service were master's degree students, even though there are more bachelor's degree students enrolled in the university.

The “*what*” section was composed of 221 questions in four main categories further divided into subcategories (Table 3). Some users asked more than one question. The categories were: in-depth questions (115; 52%), short questions (61; 28%), instruction (36; 16%) and policy (9; 4%).

The “*how*” section was composed of 224 answers, divided into 10 categories (Table 4). The most common category ($n = 60$; 27%) of the answers were bibliography lists sent to the patrons.

5.2. Virtual reference by chat

Chat service is one of the VR services offered to the library's patrons on its “Ask a Librarian” section of the library home page. It began

operating in January 2010. A total of 116 VR questions via chat were recorded and coded during December 2012. The same content analysis method and classifications were used as for the email reference service. In this case, due to lack of identification data (the service is anonymous), the “*who*” category could not be analyzed.

The “*what*” section in the chat service was composed of 116 questions (Table 5). Only three of the five subcategories of *in-depth question inquiries* were present in this case. On the other hand, the *instruction* category had seven subcategories this time. The most frequently occurring category was *short questions* ($n = 49$, 42%) with three subcategories, as opposed to five subcategories for email VR. The “*how*” section of the chat service was composed of 127 answers (Table 6), divided into nine categories (without the category *Link to Google Scholar search results* which appeared in the email reference transactions). A large percentage of the questions ($n = 47$; 37%) were forwarded to another service in the university or the library.

5.3. Reference librarians' open questionnaire

Members of the library's reference staff ($n = 16$, 70% of the reference staff members) responded to eight questions presented to them in order to elicit their thoughts, ideas, and preferences concerning virtual reference services and face-to-face reference services (Appendix A). All questions were open-ended.

Table 3
“What” section. Questions by categories: Email service.

Category	Frequency of answers	% of total answers (n = 221)	Sub category	Frequency	Percentage out of major category
In-depth question	115	52	Specific subject	74	64
			Specific source with no citation	29	25
			Specific subject material type	5	4
			Specific subject full text items	3	3
			Specific subject Hebrew items	2	1.7
Short question	61	28	Citation finder	41	59
			Circulation issues	16	26
			Citation rules	2	1
			Reference manager	1	1
			Miscellaneous	1	1
			Technical support	21	58
Instruction	36	16	Database	8	22
			Remote access	7	19
Policy	9	4			

Table 4

"How" section. Answers by categories: Email service.

Category	Frequency of answers	% of total answers (n = 224)
Bibliography	60	27
Tutorials and screen shots for explanation	45	21
No reply, but the question was forwarded	38	17
Full text items	28	12
Informative answer	23	10
Link to Google Scholar search	22	10
No answer available from the reference team	12	5
Reply: patron needs to clarify	10	4
Partial answer	8	4
Keyword suggestion for the search	5	2

Note: Some answers were placed in more than one category.

Questions 1 and 2 asked about the classification of VR questions and answers. They were asked, "Do they also reflect the content of the f2f encounters?" Most reference librarians thought they did (questions 50% and answers 64%), but some thought that additional categories were needed (questions 38% and answers 22%). Questions 3 and 4 presented the distribution of questions and answers for email VR, and librarians were asked to compare these with their estimate of the respective distributions for f2f reference encounters. Most thought the question distribution was not the same (50%) but did not provide details about the differences. They also thought that the distribution of the answers was different, and that full text items were provided in many more cases for f2f than for email (45%). Questions 5 and 6 asked the same regarding chat versus f2f. Here the reference librarians thought that the questions and answers distributions were totally different (42% for questions and 75% for the answers). When asked about the difference between the VR and f2f reference interactions, most answers indicated that the physical f2f at the reference desk was more personalized and customized to the users' information needs. Question 7 concerned the differences among the types of reference services, and Question 8 asked "Which reference service is better for the users?" The majority thought that this depended on the user and on their information needs. Distribution of the content analysis of the answers to the open-ended questionnaire is found in [Appendix B](#).

6. Discussion

6.1. Questions in VRS

VRS transcript analysis provided an opportunity to study the behavior of both librarians and users in the VR encounter. Chat and email services are essentially different by definition and indeed there was a different distribution of question types. In the email service most questions (52%) were in-depth questions. This is well reflected in the literature where studies show that VR services (mostly via email) receive a

Table 6

"How" section. Answers by categories: Chat service.

Category	Frequency of answers	% of total answers (n = 127)
No reply, but the question was forwarded	47	37
Tutorials and screen shots for explanation	36	28
Informative answer	12	9
Bibliography	10	8
Full text items	8	6
No answer available from the reference team	6	5
Keyword suggestion for the search	4	3
Reply: patron needs to clarify	3	2
Partial answer	1	2

large percentage of research questions ([Fennewald, 2006](#); [McCulley & Reinauer, 2007](#)). [Fennewald \(2006\)](#) also found that when patrons used online services, they used them primarily for "reference" questions. Previous studies concluded that the use of VR is determined by the information need of the patron ([Nicol & Crook, 2013](#)). [Croxtton and Chow \(2012\)](#) found that faculty had a clear preference for email VR, which is suitable for asking research questions. In the current study data on user types were gathered only for the email service.

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 for circulation information. 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 VR chat service.

Many reasons may provide an explanation for the differences between the two services. One possibility is that patrons have different perceptions than the librarians about the service. [Houlson et al. \(2007\)](#) found that in chat interaction most of the questions were typically "how to find" a specific article or a book, similar to the findings in the current study. [Pomerantz and Luo \(2006\)](#) found that there might be a mismatch between users' expectations of chat reference services and what these services are actually able and best suited to provide. Librarians must clarify what type of assistance is best suited to chat reference service and then make sure it is marketed to the patrons accordingly.

Another reason could be that the nature of the question determines the choice of service. Using VR by chat is synchronous and immediate. The immediacy may be a construct that reflects the chosen VR service—how important it is to get an answer or assistance immediately. [Lee \(2004\)](#) hypothesized that administrative and referencing questions have a low immediacy, so they will suggest using email VR. In contrast,

Table 5

"What" section. Questions by categories: Chat service.

Major category	Frequency	% of total (n = 116)	Subcategory	Frequency	Percentage out of major category
Short questions	49	42%	Citation finder	40	82
			Circulation issues	5	10
			Reference manager	4	8
Instruction	34	29%	Technical support	11	32
			One search	8	23
			Remote access	5	15
			Full text	4	12
			Database	3	9
			Other	2	6
			Web site	1	3
In-depth question	25	21%	Specific subject	19	76
			Specific source with no citation	4	16
			Specific subject material type	2	8
Policy	9	8%			

accessing databases and electronic resources are high in immediacy. Patrons with access problems are unlikely to want to wait for the next day, and may opt for a real time service. Connaway and Radford (2011) claim in their study that “immediate answers” and “convenience” were among the most highly rated specific features values in VRS, especially when the patron is in “desperate need for quick answers” (p. 60).

A third reason could be that users perceive chat service as a virtual reference desk with a synchronous interactional nature. They may feel that they can ask all kinds of informational questions, rather than only reference questions, as they would do in email VR service. If their question is not focused enough, they expect the librarian not to be a passive observer but to conduct an active dialogue during the session to help make the question more specific and more targeted. Foley (2002) and Cassell and Hiremath (2012) suggest that chat reference services are similar to f2f, because both are done in real time. This assumption contradicts Cummings et al. (2007), who claim that chat reference does not compete well against other available reference services. The present study did not inquire about the preferences of users with respect to VRS versus f2f, but the conclusion was drawn that email VR is more popular for research questions.

A final reason might be that the purpose of each service is perceived differently by the reference staff. Their perception is that email is meant to be a more comprehensive reference service and chat is for quick and short questions.

6.2. Answers in VRS

It is important to note how questions are handled by VR staff. Answers to questions were not evaluated based upon their accuracy, but were simply labeled as answered, referred, or other (Tables 4 and 6) for both VR services by email and chat using the same categorization.

In the email VR 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. Out 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 such as the reference desk or the email VR. Another 21% of the questions were transferred to circulation and 16% to technical support. In 28% of the chat transactions, instructions and tutorials were given on how to perform a search or how to solve a technical problem (e.g., remote access and password).

These findings clearly show that the core service of the email VR was to give answers to in-depth research questions (conducting a bibliographic search or providing search instructions). The librarian can take the time to digest and analyze a question, to find the best answer, and send it to the patron; the librarian can also correspond with the patron for clarifications and more information in order to come up with better results. This is the essence of the service according to this study's results, and seemingly both patrons and librarians are aware of it. Meaning the study uncovered the “essence of the service.” Analysis of the chat transactions revealed that a large percentage of the questions were not answered but forwarded to another service, which means that in many cases patrons' information needs were not fulfilled.

Recent studies indicate that in some libraries chat VR service is popular and high in use. Chow and Croxton (2014) found that online chat was rated highest in effectiveness, efficiency, and satisfaction among VR services. One reason for this was because transactions were faster using chat in comparison to all other services. Nicol and Crook (2013) examined the use of chat service in Washington State University's library and came to the conclusion that only 2 years after the service was launched, it had become a service that is growing and

thriving both in terms of use and in the way it is valued by the reference staff.

A possible explanation for why the chat service did not fulfill client's information needs is that librarians could not answer the questions when received because of time constraints. The chat service is defined by the library as a quick informational service and not as a comprehensive in-depth reference service. Therefore the expectation is that the interaction will end after a few minutes. As stated above 21% (25) of questions in the chat VR were in-depth research questions (Table 5). Out of the in-depth questions, 36% (9) were answered immediately using the chat service and 64% (16) were forwarded. Wikoff (2008) surveyed the reasons for which 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. She suggests that better staffing of the service would enable librarians to conduct a thorough reference interview and to fulfill their users' information needs.

Another possible reason for not being able to answer a large percentage of the chat questions might be that the librarians are unable to conduct a reference interview or to answer reference questions when assisting multiple users at the same time. This aspect was not examined in the present study, but an assumption can be made that it happens in some chat shifts. Wikoff (2008) suggests that adding more librarians to the chat shift would reduce pressure and enable them to assist waiting users and conduct a thorough interview. This would maximize the benefit from the answers. Pomerantz and Luo (2006) concluded that there may be a mismatch between users' expectations of chat reference services and what it provides according to reference policy and librarians' behavior. Also, the high percentage of unanswered questions might affect user preference and satisfaction with the service and result in even less use of the chat reference.

6.3. Face-to-face reference services: Librarians' point of view

When asked to comment on the categorization created for the analysis of the VRS interactions (both questions and answers), the reference staff thought it represented also f2f reference desk inquiries. This is reflected in Fennewald's (2006) study, 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 that virtual reference services tend to lack the instructions given to the patrons during f2f reference encounters.

In face-to-face interaction we generally perform a search accompanied by explanations on the various search tools, search targeted questions, keywords and search strategies, together with the patron. Unlike the VR when the entire process is done by the reference librarian and the patron receives only the final results.

In a physical encounter, I am trying to explain how I got to a certain item. Sometimes from the results we find another search question or more keywords to look for. We continue to search together even after I identified the best keywords for the search.

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 f2f encounters. This is reflected also in Fennewald's (2006) study that claims that librarians' emphasis is on instruction. The process of a reference interaction involves showing the user the best strategy to solve the problem presented. Moreover, librarians sometimes offer strategies rather than specific sources to their academic patrons.

From the results it appears that face-to-face is the preferred reference service among librarians. Most of them felt that f2f interaction was more effective and educational.

The reference interaction in face-to-face is deeper, optimized and customized, because we have better means to assess the information needs of the user.

Face-to-face interaction is more personal, sharing information and direct communication, are more significant for many patrons.

Not only do librarians prefer f2f reference, but patrons do as well, according to several studies (Chow & Croxton, 2012; Connaway & Radford, 2011; Connaway et al., 2009; Mu et al., 2011; Nilsen, 2006). Students indicated the physical, person-to-person reference desk was an efficient help for their information needs. Chow and Croxton (2012) further indicated reference librarians in their study believed that online chat was unquestionably the most popular virtual reference medium choice for library patrons. They claim that 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 in order to provide a useful, relevant answer was also mentioned as one of the strengths of f2f services.

VR means missing the dialogue with the patron, no in-depth interview for understanding the question.

The lack of human dimension and direct communication prevents analysis of user needs. At the reference desk we perform an interview and analyze together the question and the need, then we match the appropriate information according to user needs and abilities (language, level of understanding of the material, knowledge of the subject and willingness to work in depth).

A similar conclusion was reached by Burger et al. (2010), who found that users often do not ask the question which 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 have 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). Nilsen and Ross (2006) found that in virtual reference services the reference interview almost disappeared.

Finally, the librarians thought that which reference service is best depends on the users and their information needs.

The various reference services complement each other. Each has its uniqueness, and suits certain clients. It also depends on the user's information needs, limitations and constraints. I cannot say that one service is more meaningful for library patrons than the others.

It depends on the type of question. If it is something short, students prefer an answer by email or chat. But if it is something deeper and meaningful for their research, then their preference is f2f service.

This conclusion (that the decision as to best depends on the user) is well reflected in the literature. Thomsett-Scott (2013) claims that each user has his own preferences. Some value anonymity, while others prefer a more personal communication. Steiner (2011) writes that physical reference service 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 (2014) appeared to prefer the specific type of reference medium that most conveniently met 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.

6.4. Study limitations

The lack of age and gender information in the chat VR made it hard to analyze user group preferences. Also the lack of f2f and telephone statistics did not allow for a clear picture of how significant email and chat use is at the library compared with the more traditional services.

7. Conclusion

The study should help librarians better understand the information behavior of patrons using VRS and to adapt and adjust services of all types accordingly. The distribution of question types demonstrates the differences in user expectations of the services. The differences in the distribution of answer types show that the librarians also relate differently to chat and email VRS. VRS are here to stay, thus the findings may be used to optimize and improve VRS based on the users' information needs and the librarians' professional knowledge.

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Appendix A. 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 replied to the attached questionnaire, in order 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 it also represents 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 it also represents the contents of the face-to-face reference answers?
3. In relation to the results of the content analysis of the questions received by **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 **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 **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 **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)?

Appendix B. Questionnaire results

Question	Answer content	Frequency of answers	% of answers
Q1 n = 16 Questions classification	Fully represents f2f encounters	8	50
	Represents f2f encounters with some additions	6	38
	Partly represents f2f encounters	1	6
	Needs to be changed to represent f2f encounters	1	6
Q2 n = 14 Answers classification	Fully represent	9	64
	Represent with some additions	3	22
	Need to change	2	14
Q3 n = 16 Is the distribution of questions in email similar to f2f?	Not the same	8	50
	Similar with some changes	5	31
	Similar	2	13
Q4 n = 16 Is the distribution of answers in email similar to f2f?	Depends on other variables	1	6
	Different, most answers in f2f encounters include full text	7	45
	Different, mostly answers in f2f encounters include instruction and are not forwarded to another service	5	31
	Similar	2	13
	Not the same	2	13
Q5 n = 14 Is the distribution of questions in chat similar to f2f?	Totally different	6	42
	Similar	4	29
Q6 n = 12 Is the distribution of answers in chat similar to f2f?	Similar with some changes	4	29
	Totally different	9	75
	Similar with emphasis on instruction in f2f encounters	2	17
	Similar	7	8
Q7 n = 14 What is the difference between the VR and f2f reference interactions?	f2f is more personal and customized	6	43
	Each is different, but both tend to fulfill the user information needs	5	36
	f2f is more comprehensive	3	22
	Quite similar	2	14
Q8 n = 14 Which one of the reference services is best for the library users?	Depends on user needs and status	9	64
	f2f	5	36
	The services complement each other	2	14

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

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

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Abstract

The purpose of this study is to get insights on library users' information retrieval behavior, as reflected in log files, reports, and publishers' counts. 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. Google Scholar cannot replace the library, but it can link users to resources that the patrons can access, through library subscriptions.

Keywords

Academic libraries use, discovery tool, federated search, Google Scholar, information access behavior, information retrieval behavior, link resolver

Introduction

The academic libraries of the 21st century are able to take advantage of the Internet to make information more available to their users. The technology also enables gathering information about online usage from web analytics. This study analyzes log files of library patrons' information retrieval 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.

Research questions

This study aims to explore 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?

Literature review

A significant part of the literature concentrates on the users' process of scholarly information discovery. While searching for information became easier with the increased use of new technologies and access to numerous sources online (Colon-Aguirre et al., 2011; Little, 2012), users still find it challenging to retrieve information that satisfies their information needs (Jones et al., 2008).

Information retrieval behavior

In this paper we will refer to "information retrieval behavior" as ways to access scholarly online information sources. Some of these sources are openly available on the Web, and others can only be accessed through

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subscription. Here we will concentrate on accessing information sources provided by the library.

Information-seeking behavior

As new information delivery systems emerge, the way in which individuals search for information to support research, teaching, and learning is changing rapidly (Niu et al., 2010). Studies conducted over the last decade indicate that for their academic assignments, students tend to use Internet search engines more than searching library resources (Currie et al., 2010; De Rosa et al., 2006; Greenberg and Bar-Ilan, 2014; Metzger et al., 2003). Studies of information-seeking behavior concluded that users act according to the Principle of Least Effort (Colon-Aguirre et al., 2011), ease of use, and convenience (Connaway et al., 2012). 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.

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 and Bar-Ilan, 2014; Lee et al., 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 et al., 2011; Connaway et al., 2013).

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 researchers (they asked young researchers in their thirties) use Google and Google Scholar for scientific information and they prefer it over subject-specific databases. Their conclusion was 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 et al., 2007), the findings indicated that Google and Google Scholar were the most frequently mentioned information sources, but in tasks such as finding a reference, 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.

Search in 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. By contrast, the challenges library users encounter with dozens of different interfaces seem outdated and daunting (Lown et al., 2013; Way, 2010). Librarians organize, aggregate, store, and filter information sources thoughtfully, to make them available and to support study and teaching. They find that their faculty and students are confounded by dissimilar search interfaces that discourage the full use of information sources (Curtis and Dorner, 2005; Dempsey, 2008; Jasek, 2004). 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 and Dorner, 2005; Tennant, 2003). 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).

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 or other mobile technologies (Asher et al., 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 et al., 2013; Vaughan, 2011a). There is competition and ongoing discussion and debate as to the strengths and weaknesses of the different discovery tools.

Primo Central (by Ex Libris)

Released in mid-2010 as Ex Libris' web scale discovery component, Primo Central indexes publishers and aggregators as well as open access information repositories (Ex Libris Primo, 2012). The local library controls the authentication requirements either before the user conducts an initial search or when he tries to retrieve a full text item. Primo Central interfaces with all common link resolvers including Ex Libris' own, SFX. By default, it performs a keyword search, conducted across metadata and full text. Peer review status is also taken into account as part of the relevance (when this facet is employed). Libraries can choose the relevance ranking algorithm (Vaughan, 2011b). The library can also add an indication of status such as availability in the library and holding details (not available, online access or call number). The product offers faceted navigation on the main search screen. It also offers refine options to the search results.

Google Analytics as a source of library web site metrics

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. It also captures technical and demographic information such as the user's browser, metrics of visits, bounce rate, conversion rate, average pages per visit, average time on site, operating system, screen size, and resolution (Clifton, 2012; Kaushik, 2007; Turner, 2010). 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 et al., 2014; Clifton, 2012). The ability of the Google Analytics tool to monitor web page usage makes it a powerful tool for observing online behavior. The information provided by this service is used to answer questions regarding evaluation of web site performance and library services use (Yang, and Perrin, 2014). The library web site functions as the main source of information for patrons. Many library services succeed or fail based on how well users interact with their web sites (Yang and Perrin, 2014). Students tend to use Internet search engines more than searching library resources. They find that accessing library resources through the library web site takes much more time and effort, and they would rather use other information sources (Currie et al., 2010; De Rosa et al., 2006; Lee et al., 2012).

Search in Google Scholar

In 2004 Google launched a tool for discovering scholarly information: Google Scholar. From one place, users can search across many disciplines and sources: 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 meta search information engine (Asher et al., 2013; Neuhaus et al., 2008; Wenzler, 2008). Users can access the literature in subscription databases in one of two ways: (1) if the user is affiliated with an institution that subscribes to the database; or (2) the user pays for access to individual resources on a pay-per view basis (Pomerantz, 2013). 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. Yet, it is probable that academic scholars are attracted by the simplicity and ease of accessibility and constant improvements. 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 et al., 2013; Callicott and Vaughn, 2005; Jacsó, 2005). 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 et al., 2011). The literature discusses Google Scholar as an entry-level research tool that introduces patrons to the rich resources available at the library (Jacsó, 2005; Rochkind, 2007; Wenzler, 2008). However, some of the studies suggest that the simple search used in the Google Scholar interface, inaccurate metadata, lack of usage statistics, and inconsistent coverage across disciplines will lead patrons to use more sophisticated and expert databases to answer their information needs (Asher et al., 2013; Howland et al., 2009; Noe, 2012; Pomerantz, 2013; Wenzler, 2008).

Open URL link resolver

Link resolvers have been 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 and Zheng, 2011; Yi and Herlihy, 2007). An open URL link resolver connects the abstract/citation source to

destination aggregators to retrieve an electronic version of an item (Yi and Herlihy, 2007). Open URL has facilitated access to libraries' online resources by allowing end users to link from an article citation in one database to the full text of the article in another (Ponsford et al., 2011). Additional benefits include expanding open URL access to encompass library collections that are not electronic and providing an interlibrary loan form if the library does not own the item. Studies indicate that the implementation of an open URL link resolver directly contributes to an increase in the usage of library resources (Yi and 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 and Eichelberger, 2011; Ponsford et al., 2011).

SFX

SFX, produced by Ex Libris:

is a context-sensitive linking system intended to integrate the databases and other online services and resources that a library has to offer, thereby increasing their effectiveness. It is a product based on the open URL standard and is produced by Ex Libris, a library system vendor. (Hider, 2005: 263)

SFX has been used in libraries since 2001 (Imler and Eichelberger, 2011). SFX can integrate with Google Scholar to enable users to search the library's collection. By clicking on the SFX icon in Google Scholar, the user is redirected to the SFX link resolver system, which displays links to the selected article from the library's subscriptions (Barner and Tal, 2012). Since 2009, SFX has included a recommendation system under the brand name bX.

Recommendation systems

The increasing number of research articles being published has intensified the perception of information overload for users attempting to find relevant information. Helping users to retrieve and satisfy their information needs is a major focus of the academic library. Recommendation systems, which emerged in the mid-1990s, are one of the new approaches to help users and provide them with personalized recommendations (Lai and Zeng, 2013; Yang and Lin, 2013). In content-based recommendation methods, users are offered items similar to those that they have used in the past or preferred items of people with similar interests and preferences. Another goal of recommendation systems is to "push" relevant new content without additional user interaction (Govindaraju and Ramanathan, 2012). The user's ability to find relevant information depends on her/his ability to phrase good queries. In spite of the ubiquity of search engines, navigating and finding information remains a

complex problem. With the recommendation system, the relevant items found in the search can serve as a starting point for reaching new and important information. In their study, Lin et al. (2008), analyzed search interactions in PubMed. Their study suggests that the "related article" search is a useful feature and that browsing it has become an integral part of how users interact with the database.

Ex Libris bX

The system harvests metadata from the SFX usage log files, representing researchers' patterns of selecting information across platforms, publishers, and journals. The data are collected from all the subscribing institutions. The bX recommendation service is similar to a commercial web site recommender. When a user searches for a specific article she gets a list of articles other users found interesting (Barner and Tal, 2012; Ex Libris SFX, 2012).

COUNTER – Counting Online Usage of NeTworked Electronic Resources

The use of online information resources is growing rapidly. 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 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).

Methodology

This study utilizes data collected from the Israeli University of Haifa's library systems log files:

- logs obtained from the open URL link resolver log files, from 2011 to mid-2014. The data were collected using a query that was activated monthly, counting requests for full texts of articles as received from the system;
- publishers' reports that are COUNTER-compliant reports, indicating use of resources via library subscription during the given period. The reports were received from MALMAD (the Inter-University Center for Digital Information Services in Israel);
- Google Analytics data of the library's main home page. The number of visits to the home page and the number of hits of the discovery tool search box (located on the main home page).

Data (link resolver logs, publishers' report, and Google Analytics) were provided for the period between January



Figure 1. Screen shot of the library's federated search box as it appears on the library's home page.



Figure 2. Screen shot of a discovery tool search result with the referral to the library link resolver system.

2011 and June 2014. All data were collected and processed using Excel data sheets. From these 42 months, 18 months were selected and the data were carefully analyzed.

The study uses several formats of files from distinct sources:

- log files from the library's open URL link resolver in html format. These files needed processing and adjustment in order to load them into Excel data sheets;
- publishers' records of full text download accessed through the library's subscriptions. These were provided as tables and were copied to the Excel data sheets;
- library's home page hits and visits reports as documented in Goggle Analytics were collected from the application data. The analyzed data were transferred to Excel.

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 from the open URL link resolver requests the system received from the library's discovery tool were collected and compared with the publishers' report on full text downloads.

Results

The study focuses on quantitative analysis of data from the log files. Data were available for 42 months (some data were missing for some of the months) between January 2011 and June 2014. The data were collected from the open URL link resolver system used by the library (SFX by Ex Libris), from the publishers' report on full text downloads, and from Google Analytics on web site visits. Eighteen months were selected for deeper analysis.

Full text requests from the library open URL link resolver service

The University of Haifa library (the Younes and Soraya Nazarian Library) uses Ex Libris' Primo Central as its discovery tool. The search box is located on the library's home page and contains four search options: books, articles in Hebrew, articles in English, and databases (see Figure 1). The use of the search box will refer the users to the discovery tool search interface.

Users access the full text of a source through the results page of the discovery tool (see Figure 2). By clicking the "Online resources" option the patron reaches the URL link resolver interface. Log files of full text requests from the library discovery tool were collected and analyzed, taken from the URL link resolver service (Ex Libris SFX) between January 2011 and June 2014.

Library patrons who choose to use Google Scholar can access full text items using library subscriptions. First they need to identify themselves as library users and perform the search. Then, in order to retrieve the item's full text they can either use the title of the item to connect directly to the publisher's web site, (if the publisher enables it and the library has

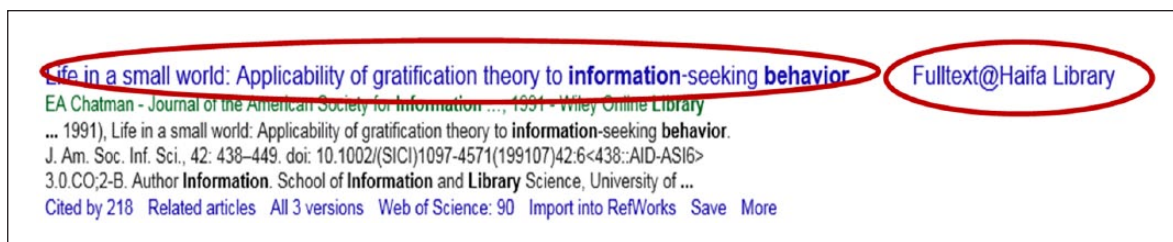


Figure 3. Screen shot of a Google Scholar search result with the referral to the library's link resolver system.

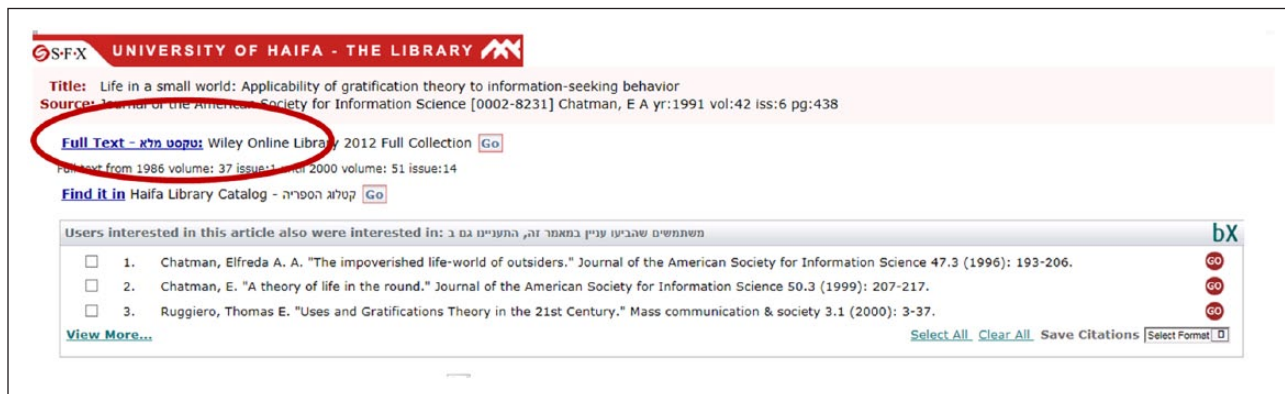


Figure 4. Screen shot of the open URL link resolver window with the referral to the library's full text link.

a subscription to the given item) or use the open URL link resolver service (see Figure 3). The open URL link resolver appears as “Fulltext@Haifa Library” beside the item.

When users click on this link, the system opens the library open URL link resolver interface, for full text options from library subscriptions (See Figure 4). A link to the library catalog is also provided.

Both options (pressing the title or the open URL link resolver link), will retrieve full text from library subscriptions. Thus the patrons can access the items through the link resolver either from the library discovery tool or by clicking on the “Fulltext@Haifa Library” link. The other option to download items available through the library's subscription is by linking directly from Google Scholar or by visiting the publisher's web site and downloading the item from there. Log files of full text requests from Google Scholar were collected and analyzed from the URL link resolver service (Ex Libris SFX) between January 2011 and June 2014.

Full text requests from the library discovery tool were obtained from the open URL link resolver service (Ex Libris SFX) for 18 selected months (between 2011 and mid-2014). It is important to clarify that library patrons using the discovery tool can only access the full text through the open URL link resolver service. The discovery tool full text requests were compared with full text requests from Google Scholar that were fulfilled only through the open URL link resolver service (see Table 1), in order to understand from where library patrons – using the open URL link resolver service – search and retrieve

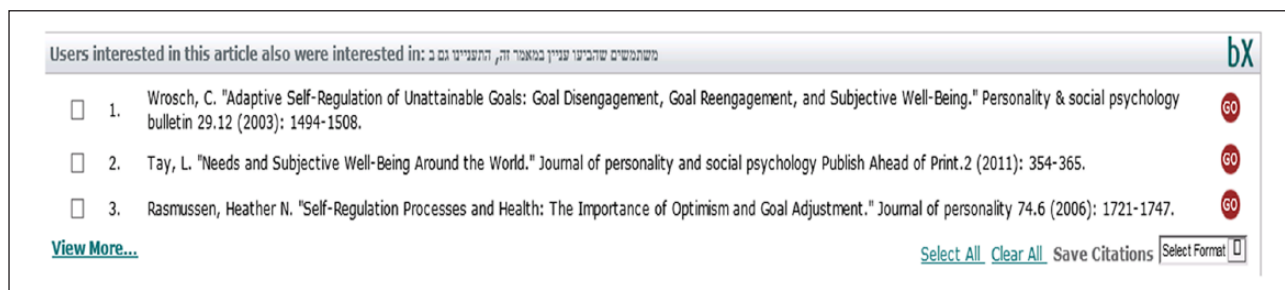
their information sources. In the table there are monthly averages for selected months in each year, for both Primo Central and Google Scholar. As noted above there is also an option to access articles found on Google Scholar without the need to go through the link. The average number of requests for all the months in the sample was computed for each year separately. For requests that go through the link resolver, the library discovery tool is used more than Google Scholar. Discovery tool requests are 95% higher, at 15,116 (the average per month for all the months covered) compared to Google Scholar requests to the link resolver, which is 7753. As mentioned earlier, it is important to note that Google Scholar service allows users to connect directly to the publisher's web site (if the publisher enables it and the library has a subscription to the item through the publishers and not through some aggregator), and retrieve library subscriptions, so these data only represent users who choose to use the “Fulltext@Haifa Library” link (see Figure 3) and enter the open URL link resolver interface to retrieve the full text of the article from the library subscriptions. Below we estimate also the number of requests that do not go through the library's open link resolver based on the publishers' reports.

Recommended resources use – bX service

The library offers a recommendation system that harvests metadata from the open URL link resolver (Ex Libris SFX) usage log files and offers the user similar sources

Table 1. Full text requests from the library discovery tool and from Google Scholar fulfilled by SFX (library's open URL link resolver).

Year (monthly averages for the selected months in each year)	Primo Central	Google Scholar
2014 – three months	19,646	7363
2013 – five months	15,669	8039
2012 – five months	15,018	7340
2011 – five months	10,131	8270

**Figure 5.** Screenshot of the bX service.

accordingly. This service is a part of the open URL link resolver. The recommendation system bX is embedded in the interface and when the patron presses on the full text button she/he gets recommended sources (see Figure 5) with the possibility of clicking them to get the full text. The system only recommends items that are available through library subscriptions; the default number of suggested resources is three.

To learn about the information behavior of the library patrons, data on the use of the recommended resources service (bX) were collected and analyzed. The log files provided data from January 2011 to June 2014. We calculated the average number of requests for full text from the bX service for all the months for which data were available. Due to small fluctuations between the months, the averages were computed per year.

The use of the service is relatively low in comparison to full text requests from the open URL link resolver (see Table 2) and remains stable with a sharp decrease in 2014.

Full text downloads from library subscriptions full text request report, in comparison to library discovery tool full text requests

Full text downloads using the library subscriptions were reported by the publishers. The publishers' reports were received from MALMAD (the Inter-University Center for Digital Information Services in Israel). From the 42 months between 2011 to mid-2014, 18 months were sampled. The total of full text requests from the library discovery tool were obtained from the open URL link resolver service (Ex Libris SFX) for the same 18 selected months.

The publishers' full text request report (according to the COUNTER standard) represents all the full text download requests, regardless of the full text request source (the library's link resolver or Google Scholar or direct access from the publishers' web sites). On average (for the 18 months in the sample) the publishers' full text request report was 45,512 per month. The average full text requests registered from the library discovery tool (through its URL link resolver service) in the same period was 14,612 per month (i.e. publishers report 3.1 times more downloads than requested from the library discovery tool), as shown in Table 3. Thus most of the requests are not issued from the library's discovery tool. When presenting the data on a monthly basis (see Figure 6 and Table 3), we can see a drop in requests between July and October due to the summer break.

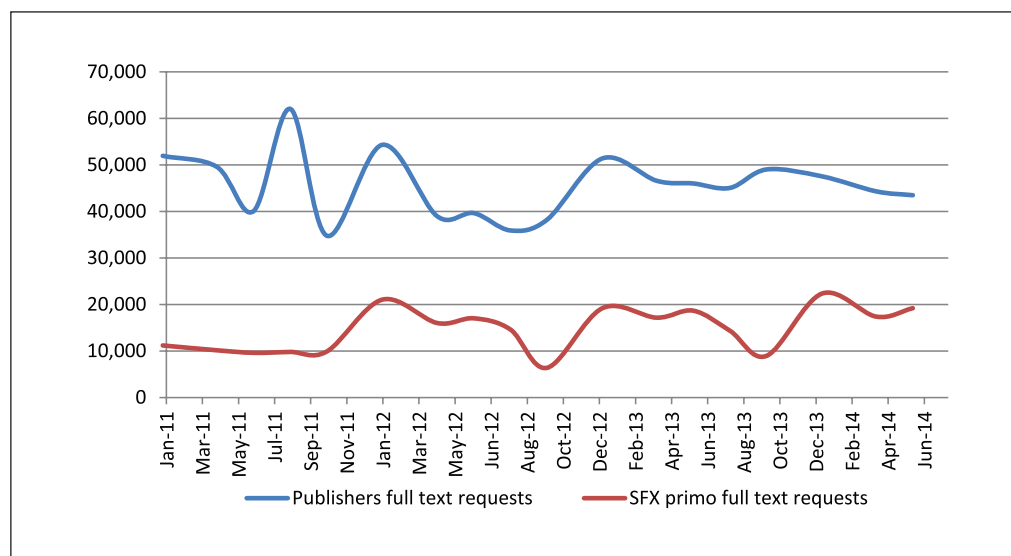
A more detailed analysis of the full text requests registered from the library discovery tool (through its open URL link resolver service) indicates an increase in use of the discovery tool as a mean of full text access and retrieval. In 2011 the average full text requests were 10,131; in 2012 the average requests were 15,018; in 2013, 15,669; and to mid-2014, 19,646 (see Figure 7). Comparing 2011 to mid-2014, the usage increased by 94%. The number of full text requests from the library discovery tool in 2014 compared to the total of full text request reported by the publishers, indicates a smaller gap than when considering all three-and-a-half years. The data reveal that publishers report 2.3 times more downloads than the library discovery tool for full text requests (while for the three- and-a-half year analysis, the number of downloads reported by the publishers was 3.1 times more than the number of downloads via the discovery tool).

Table 2. Full text requests through the bX service.

Year	2014	2013	2012	2011
Full text requests from the bX service (monthly averages)	542	729	788	783

Table 3. Full text requests from the library discovery tool compared to full text requests reported by the publishers (from the publisher log files that are COUNTER-compliant reports).

Year	Month	SFX Primo full text requests	Full text request reported by the publishers
2011	January	11,191	51,969
	April	10,150	49,592
	June	9605	40,086
	August	9794	62,065
	October	9913	34,774
2012	January	21,042	54,334
	April	16,018	39,004
	June	17,028	39,656
	August	14,619	35,926
	October	6381	38,245
2013	January	19,207	51,416
	April	17,165	46,611
	June	18,666	46,027
	August	14,345	45,070
	October	8961	49,045
2014	January	22,345	47,556
	April	17,395	44,336
	June	19,198	43,497

**Figure 6.** Longitudinal trends.

Library discovery tool sessions compared with the visits to the library's home page

Google Analytics data of the library's web site were used as an indication of the use of the library home page.

Entrance hits and average session times were collected for the same 18-month sample, as above. Google Analytics data were also used as an indication of library patrons use of the discovery tool search box, for the same months as above. The search box of the discovery tool (Primo by Ex

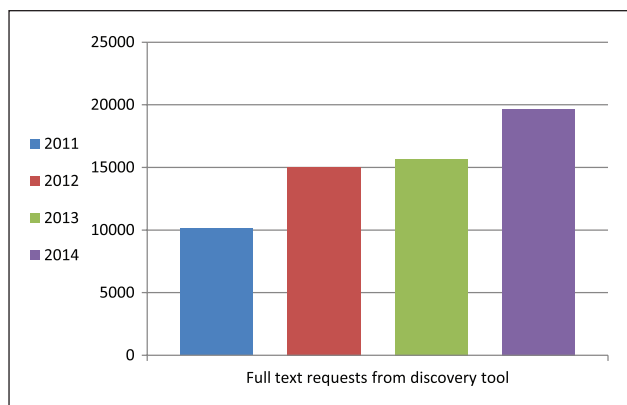


Figure 7. Full text requests from the library discovery tool.

Libris), is located in the center of the library's main home page (see Figure 8). Each search query will refer the user to the discovery tool interface.

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 (see Table 4). The average number of entries to the home page for the 18-month sample, from 2011 to mid-2014, was 81,812; and the average session time was three minutes. The average number of entries to the discovery tool for the 18-month sample from 2011 to mid-2014 was 40,062, while the average session time was six minutes. The number of times users entered the library's home page was more than twice the number of times patrons chose to use the discovery tool search box, but on the other hand, the session length of the discovery tool usage was twice as long as the average session length of the library home page. Even though the discovery tool's search box resides on the library's home page, once the user clicks on "search", she/he is transferred to a page dedicated to the search tool; thus the session length can be measured.

Discussion

The study uses log files and data from different sources to get insights on the library user's information retrieval behavior.

Full text requests from the library open URL link resolver service

Data from the open URL link resolver service (Ex Libris SFX) capture only some of the requests for full text articles. Findings refer to users who choose to use the link resolver service, from the library discovery tool, or from Google Scholar (as we mentioned earlier in this paper – library patrons using the discovery tool can only access the full text through the open URL link resolver service, while patrons using Google Scholar can in most cases, use the

item's title to link directly to the full text). In both cases – from the discovery tool and from Google Scholar, when clicking on the resolver link, the patron gets the same interface which connects her/him to the library subscription of full text. All three-and-a-half years of data (2011 – mid-2014) indicate that for retrieving full text only from the link resolver 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 which relate to the use of the library's link resolver and compare requests coming from different sources. The data presented here cannot testify to the use of the discovery tool in comparison to Google Scholar, only in the context of the use of the library's open URL link resolver service. Google Scholar users can choose to use the link resolver 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 the library subscriptions) directly from the publisher. The findings indicate that patrons are using the library's discovery tool to some extent. The discovery tool is designed as a single point of access, which leads to a wide range of library content through a Google-style search box (Asher et al., 2013). Using the library, faculty and students have come to expect a simplified, fast, all-inclusive, and online research experience, resembling their use of Google and other search engines. 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. Noe (2012) suggests that limits or facets that are intuitive and effective are essential and beneficial over what Google Scholar offers. The library federated search box does exactly this, simplifying the search across all available databases, and enabling one, easy-to-use interface for qualified academic sources, taking into account the information needs of the users.

Recommended resources use – bX service

Use of the recommender resources services, offered by the open URL link resolver service, is relatively low in comparison to the use of the open URL link resolver service (see Tables 1 and 2). The use is stable through 2011–2013, but decreases in 2014 (with an average of 729 per month in 2013 and an average of 542 per month in 2014). A recommendation system helps users discover additional information sources according to their preferences and needs

The screenshot shows the library's home page with a blue header containing the logo and name 'Younes & Soraya Nazarian Library University of Haifa'. Navigation tabs include 'Remote Access', 'Library Card', 'General Information', and 'Opening hours'. A search bar is present with the text 'Find articles in English & foreign languages'. A chat window on the right asks 'How can I help you? Talk to us via chat' with hours '10:00-16:00'. The footer contains contact information: '© University of Haifa, Nazarian Library - All rights reserved / 199 Aba Khoushy Ave., Mt Carmel, Haifa 3498838 / Contact us / Tel. 972-4-8240264'.

Figure 8. The library's home page.

Table 4. Library discovery tool session count compared to web site entrance count.

Year	Month	Discovery tool entries	Average session time	Web site entries	Average session time
2011	January	25,478	00:05:00	110,975	00:02:00
	April	23,456	00:07:00	78,876	00:02:00
	June	27,035	00:06:00	93,549	00:02:00
	August	29,418	00:07:00	66,503	00:03:00
	October	24,961	00:08:00	58,238	00:04:00
2012	January	60,240	00:06:00	104,057	00:05:00
	April	38,788	00:07:00	73,309	00:04:00
	June	47,159	00:07:00	81,177	00:04:00
	August	34,828	00:07:00	60,837	00:03:00
	October	38,245	00:07:00	75,470	00:04:00
2013	January	57,253	00:07:00	95,077	00:03:00
	April	49,277	00:06:00	85,151	00:03:00
	June	47,386	00:06:00	83,888	00:03:00
	August	35,444	00:05:00	62,966	00:02:00
	October	42,098	00:06:00	90,107	00:03:00
2014	January	52,546	00:06:00	93,963	00:02:00
	April	44,770	00:06:00	77,195	00:02:00
	June	42,727	00:06:00	78,276	00:02:00

(Yang and Lin, 2013). The cause of low use in the system can be that the system is not efficient enough and produces redundant results (Govindaraju and Ramanathan, 2012). Another reason can be that the library's patrons expect to

use the link resolver system to retrieve the full text of the articles and not to search for new information sources. Ponsford and colleagues (2011) found in their study that information seekers focus on the links to the full text

available online and overlook links to additional options, such as recommendations, journal peer review status, help texts, and others. Holdings, volumes, and dates are also ignored in favor of the first link offered to full text. The suggested articles services are usually offered by the publishers or the information suppliers and the patrons are accustomed to look for it in other interfaces or sources. In their study about search interactions in PubMed, Lin and colleagues (2008) suggest that the recommendation system (related articles) service has become an integral part of how users interact and search for information. The last reason may be users' unawareness of the service. Because the bX service is located below the referral to full text, users possibly press the full text icon without noticing the service suggested further down.

Full text downloads from library subscriptions in comparison with library discovery tool full text requests

The findings of both full text download requests (as documented in the publishers full text request report – according to the COUNTER standard) and the library's discovery tool full text requests (as documented in the library open URL link resolver service), enable us to speculate about the library patrons' retrieval behavior. Data collected (in the selected 18 months between 2011 and mid-2014) from publishers full text request report, 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 publishers' full text request report is 45,512 on average per month, where the full text requests from the discovery tool are 14,613 on average per month.) The huge difference between the use of the library discovery tool and other search interfaces (assuming the main alternative is Google Scholar) 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 (Currie et al., 2010; Greenberg and Bar-Ilan, 2014; Lee et al., 2012). Connaway et al. (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 et al., 2011, Neuhaus et al. Asher, 2008). Others claim that the algorithms Google Scholar uses to return result sets cannot really be compared to library database algorithms (Howland et al., 2009); however, the more publishers share their

content with Google Scholar, the more 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 will 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%. The library introduced the discovery tool search box in October 2009, and over time the service became more and more popular. Upon analyzing the difference between the library's discovery tool full text requests and publishers' full text request report from 2014 data, findings indicate that the gap narrowed to from 3.1 to 2.3 (i.e. patrons accessed full texts via other information sources 2.1 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 becomes more popular and accessible as the library users become more familiar with the service. In light of our findings and the extensive literature on the subject, we conclude that 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. Adoption of technology by libraries had the effect of enabling and empowering users to seek information for themselves (Pomerantz, 2013) and made searching and retrieval more accessible and available. Libraries have always provided mechanisms for users to both discover and access information resources. Using library subscriptions indicate 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. Having said that, it is also important to state that the problem with this approach is that the user often does not know or recognize that he is using the library's offerings (Lewandowski, 2010).

Library discovery tool session count in comparison to library main home page session count

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 and 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. 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 (2004: 10) states that “most users come to a library site wanting to do research, and the shorter their paths, the happier they are”. 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).

Conclusion

The study reflects that the library’s discovery tool is not the major source for accessing full text items. Google Scholar is the patron’s preferred choice for their retrieval behavior, but the fact that it can link to library subscriptions enables the library to be the provider of its patrons’ information needs. Libraries should consider further analysis of patrons’ retrieval behavior and change their discovery tool interface accordingly. The analysis of the usage data enables a better understanding of the patrons’ information needs and behavior.

Study limitations

The lack of information on the source of requests for full text downloads from the publishers report does not allow us ascertain whether the majority of the requests were received through Google Scholar.

The study also uses several formats of files from distinct sources, which complicated data comparison.

Recommendations

Further studies should be conducted on the information behavior and information retrieval behavior of the library’s patrons, using several information system log files. The study’s conclusions should provide input for library administrators in rethinking the role of the library as a discovery tool for academic information.

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Author biographies

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For 10 years she was the library's web site editor and for the past two years she has been the head of the library's marketing and outreach team. Riki has published several articles in Hebrew and in English and her areas of interest include: information needs, library reference services, information behavior, and library services log analysis.

Judit Bar-Ilan is Professor at the Department of Information Science of Bar-Ilan University in Israel. She received her PhD in Computer Science from the Hebrew University of Jerusalem

and started her research in Information Science in the mid-1990s at the School of Library, Archive and Information Studies of the Hebrew University of Jerusalem. She moved to the Department of Information Science at Bar-Ilan University in 2002. She is a member of the editorial boards of *JASIST*, *Scientometrics*, *Journal of Informetrics*, *PLoS ONE*, *Cybermetrics*, and *Online Information Review*. Her areas of interest include: informetrics, information retrieval, Internet research, information behavior and usability.

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 לכתובת 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 לשרותי 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 הבודק 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 בשרות, לעומתם דוברי שפת אם ערבית השתמשו בו לעיתים קרובות.

מאמר שני

במאמר השני נעשה שימוש בניתוח תוכן של שני שירותי יעץ וירטואליים מבוססי אינטרנט. בשרות הצ'ט (116 פניות) ובשרות 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 שרותי יעץ וירטואליים לשרותי יעץ פנים מול פנים.

אחד הממצאים הבולטים במחקר היה ששרות הצ'אט אינו עונה על צרכי המידע של המשתמשים. בשרות הדוא"ל, רוב השאלות היו שאלות יעץ נושאיות (שאלות יעץ מעמיק), רוב התשובות כללו רשימה ביבליוגרפית של פריטי מידע הרלוונטיים לשאלה הנושאית. בשרות היעץ בצ'אט, רוב השאלות היו שאלות קצרות. בחלק גדול מהמקרים השאלות לא נענו באופן מייד, אלא הועברו לשרות יעץ אחר (שרות יעץ פנים אל פנים, או שרות יעץ בדוא"ל). בשאלון הפונה ליועצים, כשנשאלו על ההבדל בין שרותי 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.

דין

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 פיסי 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 נמצאו 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 שאילתות 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 יכיל 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 וכתובה.

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:

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המחלקה ללימודי מידע

הוגש לסנט של אוניברסיטת בר-אילן

כסלו תשע"ז

רמת גן