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Book or NOOK? Information behavior of academic librarians

Elizabeth McDonald, Marina Rosenfield, Tim Furlow, Tara Kron and Irene Lopatovska
School of Information and Library Science, Pratt Institute, New York, New York, USA

Abstract

Purpose – The purpose of this paper is to understand patterns in information behavior of academic librarians, individuals who influence information technology adoption in academic libraries and parent institutions. Librarians' perception of their student patrons' information behavior was also investigated.
Design/methodology/approach – An exploratory study investigated professional and personal information behavior of eight librarians employed by various academic institutions in the Greater New York City area. The data were collected in face-to-face interviews and analyzed using the content analysis technique.
Findings – The study found that librarians' institutional affiliations had no effect on their information behavior. The patterns in librarians' information behavior at work and leisure suggest that those behaviors are influenced by contextual variables, personal preferences and tasks, and are no different from the general population. Overall, librarians had accurate, evidence-driven understanding of their student patrons' information behavior.
Research limitations/implications – The study findings have limited generalizability due to the small sample size and limited geographical pool of participants.
Practical implications – Academic library is often seen as the hub of the adoption of information technologies as librarians introduce new digital content and resources to the rest of academia. Understanding information behavior of academic librarians contributes to understanding factors that are affecting technology adoption in academia overall, and can potentially inform recommendations for optimizing academic library offerings.
Originality/value – The study is an original investigation of the relationships between institutional characteristics and librarian demographics, librarian information behavior at work and leisure, and librarians' perception of students' information behavior and information preferences.

Keywords Interview, Academic libraries, Librarians, Human information behaviour, Information technology adoption

Paper type Research paper

Introduction

The use of digital technology for accessing and disseminating information continues to rise in academia (Phan *et al.*, 2014). From digitized collections of traditional print materials to electronic databases and e-books, digital content made accessible via new information technologies broadens opportunities for academic research, teaching, and content creation (Tetrault and Reaume, 2014; Russell *et al.*, 2013; Abderrahim *et al.*, 2013). In academic environments, the library can be seen as the hub of the adoption of these technologies as librarians introduce new digital content and resources to the rest of academia (Mulholland and Bates, 2014; Polger and Okamoto, 2013; Witten and Bainbridge, 2002). Considering the important role played by librarians in the broader trends of information technology adoption in academia, it is important to understand librarians' personal information behavior and attitudes toward technology, as these factors affect librarians' ability and inclination to advocate or deter the adoption of new digital resources by faculty and students (Blackburn, 2011).

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Despite the critical role librarians play in information technology adoption in academic libraries and parent institutions, questions about their own habits and preferences have seldom been asked. In order to bridge this gap, we conducted an exploratory study to investigate professional and personal information behavior of several librarians employed by various academic institutions in the Greater New York City area. Specifically, we sought to answer the following research questions:

RQ1. What factors affect the information behavior of academic librarians?

RQ2. Does the information behavior of academic librarians influence their perception of student information behavior?

Literature review

There is currently a proliferation of digital resources in American academic libraries. The National Center for Education Statistics found that "in fiscal year 2012, academic libraries added 52.7 million e-books, resulting in total e-books holdings of 252.6 million units" (Phan *et al.*, 2014, p. 2). In conjunction with this trend, the number of studies on information technology adoption in academia is also on the rise. Popular themes in technology adoption literature include information technology use, preferences of college students (Rod-Welch *et al.*, 2013; Lopatovska *et al.*, 2014; Foasberg, 2011) and faculty (Dodds *et al.*, 2014; Mulholland and Bates, 2014) as well as issues pertaining to the development of digital collections and services (Dewan, 2012; Walters, 2013; Newman and Bui, 2010; Blummer, 2006). In an effort to understand the perspectives of those responsible for academic library offerings, several recent studies focussed on information behavior and technology use of academic librarians.

In an effort to understand the adoption of e-readers by academic library staff, Hussong-Christian *et al.* (2013) conducted a longitudinal study wherein they gifted e-readers to 30 Oregon State University Libraries and Press librarians and staff. In return for the e-readers, librarians agreed to participate in four interviews conducted over 12 months to determine their reading habits and e-reader use before, during, and after the study. Two major findings of the study included librarians' preference for leisure reading over work reading on their e-readers and the overall preference for multi-functional tablets over single-function e-readers. The authors identified several challenges experienced by librarians during their interactions with e-readers, including problems with finding and using content, limited instructions, and device functionality. Participants' experience with e-readers prompted a service change in the form of an extension of the loan term for e-books and an online catalog feature enabling the search of e-books only.

Other studies have focussed specifically on librarians' perspectives on e-book adoption in academia. Vasileiou *et al.* (2012) surveyed 32 academic librarians from seven libraries of Manchester Metropolitan University in the UK to determine librarians' vision of the future of e-books. All participants predicted that academic e-book collections will continue to grow, though librarians' estimates of anticipated growth rates varied. Participants also expected that digital and print formats will co-exist, with only three individuals predicting e-books taking over as the dominant format. Availability and affordability of titles from e-book vendors and platform functionality were flagged as essential for e-book adoption. Participants also cited student preferences as an important predictor of e-book adoption, including increased demand for electronic format in certain academic disciplines and distance learning. A similar study was conducted in 2009 by HighWire Press (Newman and Bui, 2010).

During the study, 138 librarians from 13 countries were surveyed on their attitudes and practices relating to e-books. Though 62 percent of survey respondents who worked in graduate, professional, or undergraduate libraries indicated that their libraries spend less than 10 percent of their acquisitions budget on e-book purchases, the respondents were confident in the rapid growth of e-book adoption in the near future. The study mostly focussed on librarians' experience with e-book management – including format preference, platform selection, vendor relations, acquisition drivers, and preferred models for e-book purchase. Though both studies focussed on librarians' views on growing e-book adoption in their work environments, including the need for more technology equipment, user support, the re-purposing of space that historically only held print collections, and changes in workload; librarians' personal information preferences were not investigated.

In addition to their role in selecting resources for the library, librarians also serve as information sources on the availability and functionality of digital content. Mulholland and Bates (2014) found that 65 percent of students participating in the study had become aware of the availability of e-books in their college's library through e-mail notifications from a librarian. Vasileiou *et al.* (2012) identified the need for librarians to offer e-book training for faculty as already provided at universities including the University of Tampere, which began both instructing library staff to use e-books and "training and motivating University staff to integrate e-books to teaching" in response to an increase in the size of their e-book collection (Ahlholm-Kannisto *et al.*, 2014). Rod-Welch *et al.* (2013) recommended a set of the strategies librarians can adopt in promoting the knowledge and use of e-books, including instructing users on finding and accessing e-books, using e-books during reference interviews, promoting the value of electronic formats and the unique features of e-books, and creating instructional e-book documents and videos for faculty. These strategies extended beyond e-books for general digital instruction (Lampert and Dabbour, 2008), and fulfill components of the Association of College and Research Libraries' Standards for Libraries in Higher Education Task Force (2012), including providing instruction, providing professional development for faculty, and keeping current with technological innovations.

The importance of librarians keeping up with technological trends is discussed in Aharony (2013) and Aharony and Bronstein (2014). The researchers have shown that librarians who are comfortable with information technology are more likely to use it in their work (Aharony, 2013; Aharony and Bronstein, 2014). In response to these findings, the authors recommend a wider adoption of information technology for librarians' personal information behavior and propose integrating more technology skills into the Library and Information Science curriculum to help improve future librarians' services (Aharony and Bronstein, 2014).

Although academic librarians have occasionally been the subject of technology adoption studies (Aharony, 2013; Hussong-Christian *et al.*, 2013; Aharony and Bronstein, 2014), they have rarely been asked about their personal information behavior habits or their perceptions of their patrons' needs. Furthermore, past studies have usually examined one specific institution at a time rather than a set of diverse academic institutions. We developed a study to fill some gaps in prior research and to extend the current research on information behavior of academic librarians. In order to answer our research questions, the study focussed on understanding the relationships between librarians' demographics, personal and professional information behavior, and understanding of students' information behavior and needs.

Methods

In order to explore librarian preferences, as one important factor in technology adoption in academia, we investigated the factors affecting librarians' information behavior and the influence of that behavior on librarians' perception of student information behavior. We operationalized the concept of "information behavior" by: context-specific information needs, technology/devices used to obtain or produce information that satisfies these needs, and specific uses of this information. We decided to explore information behavior in both professional and leisure contexts, as the latter is a better indicator of true preference (e.g. librarians may be required to use a laptop supplied by their workplace) and a comparison of the two contexts can reveal the difference between technology that people are forced to accept and technology that they welcome. Based on our review of the literature, we developed a model of relationships between librarians' demographics, academic institution characteristics, librarians' information behavior in professional and leisure contexts and librarians' perceptions of student information behavior and preferences (see Figure 1). We initially hypothesized that institutional characteristics and librarian demographics affect librarian information behavior and preferences, which in turn affect librarians' perception of students' information behavior and information preferences (Figure 1).

Semi-structured interviews were used to collect study data because this method allowed us in-depth investigation of participants' perspectives. The semi-structured nature of the interviews allowed multiple investigators to collect similar data but also to ask follow-up questions and rearrange questions to elicit the most detailed information possible. An interview instrument is one of the most popular methods for investigating information behavior of various populations (Hernon *et al.*, 2007) and was recently used in several studies of librarians' information behavior (Vasileiou *et al.*, 2012; Hussong-Christian *et al.*, 2013). The interview questions were designed to collect information on three study constructs:

(1) contextual variables, including librarian demographics and institutional characteristics;

(2) librarian information behavior, including information needs/devices/uses for work and leisure; and

(3) librarian's perception of students' information behavior, including perception of the actual behavior and information technology preferences.

The information on academic institutions was collected from institutional web sites and the American Library Directory (2014). Librarian demographics included participants' years of experience in academic librarianship, their rank and title, and the primary

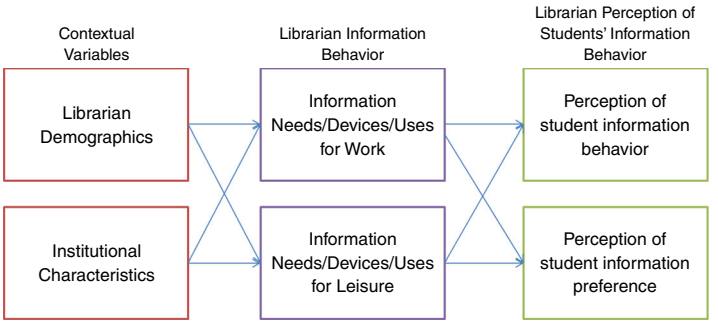

Figure 1.
Initial model of academic librarian information behavior

responsibilities of their current position (Questions 1-3, Appendix). We hypothesized that information about participants' years of experience was relevant for understanding their familiarity with the information resources needed for performing their job responsibilities. The participants' ranks, titles, and job responsibilities were ascertained to determine the professional requirements that could drive librarians' information behavior, and their level of direct contact with and observation of students' information behavior.

The second cluster of questions focussed on participants' information behavior inside and outside of a professional context (Questions 4-14, Appendix). More specifically, participants were asked about their academic and leisurely information needs, the type and level of use of information devices, and the content accessed to meet those needs. The specific questions about librarians' information behavior were inspired by traditional human information behavior models that include information need, as well as information systems/tools and content available or used to satisfy the need (Wilson, 1999). Additional questions pertaining to librarians' information behavior focussed on reading habits, e-book usage, content choices, and reading device preferences (Questions 4-14, Appendix).

The third cluster of interview questions collected participants' reflections on the information behavior of students attending their academic institutions of employment. Participants were asked to share their knowledge of students' academic information needs, and the formats and devices they observe students using to address those needs (Questions 15-20, Appendix). When available, participants were also asked to provide accounts of institutional research on students' information habits.

The data were gathered through individual semi-structured interviews with eight librarians in October of 2014. Interview sessions were conducted on a one-on-one basis by a team of four researchers, with each interview lasting between 30 and 60 minutes. Participants were recruited through a snowball convenience sampling technique (Patton, 2002) and represented a variety of librarian positions and academic institutions in the Greater New York City area, including four private research universities, one private religious university, and one public research university. The sample included six female and two male librarians, including two subject specialist librarians, two instructional librarians, two collection development librarians, a reference librarian, and a librarian in a managerial position (Table I). Respondents' years of service in academic libraries ranged from one to 37 years.

Results

Participants' characteristics

The eight librarians selected for interviews represented a range of professional experiences and positions. Four of the eight interviewed librarians had more than 20 years of professional experience, two had between ten and 19 years of experience

Librarian position	Responsibilities
Instructional librarian (2)	Teaching/workshops; reference; outreach; scholarly development
Subject specialist (2)	Instruction/teaching/workshops; assessment; special collection; management and budget
Collection development librarian (2)	Collection development/management; data services/license management; vendor relations; budget management; scholarly communication
Reference librarian	Reference; collection development
Librarian in managerial position	Management; budget management; committees; outreach; teaching

Table I.
Participants' positions and responsibilities

and two had less than nine years of experience. Participant job titles and responsibilities varied as well. It is worth noting that most of the interviewed librarians performed a wide array of professional tasks not always represented in their titles (see Table I for the set of responsibilities for each position type).

Institution characteristics

Librarians were recruited from six different academic institutions with great variation in college student population and collection statistics (Table II). The sample included a large private university with a size of student population around 60,000 and a small private university with fewer than 2,200 students. The size and content of the participating library collections also varied greatly, from a large print and electronic collection of Columbia University's millions of print and electronic volumes to the Stevens Institute of Technology's collection of just under 200,000 print and electronic books. Print volumes were normally much higher than electronic book collections except in Stevens Institute of Technology. Columbia University has the largest differential in print volume collection compared to electronic book collection, and represented the largest collection for both print and electronic books.

Librarians' information behavior – work

Librarians reported high levels of digital device use for professional needs. As one participant (P2) articulated: "I live in a digital universe." The most frequently used devices in a professional setting included a desktop computer (eight), smartphone (seven), and laptop (six); the least frequently mentioned tools included a book (one), printer (one), and tablet (one). Most participants were provided with a desktop or laptop computer at work. The most frequent professional activities performed on the digital devices were sending, reading, and writing e-mails (eight), reading professional documents (four), and writing (four). When asked whether they use digital devices

Institution (type)	Student population	Graduate population	Print book volumes	Electronic books
Columbia University (private)	29,250 (2013)	18,568 (2013) (not including continuing education and global programs)	15,526,613	1,289,132
New York University (private)	58,547 (2014)	24,289 (2014)	5,462,207	1,000,000+
Brooklyn College (public)	16,463 (2014)	3,187 (2014)	1,449,388	124,300
LIU Brooklyn (private)	8,503 (2014)	3,477	273,917	120,000
Stevens Institute of Technology (private)	5,950 (2014)	3,700	79,950	120,000
Caldwell University (private)	2,182 (2013)	606	150,000	112,000 (2014)

Sources: American Library Directory (2014), Caldwell University (2014), Caldwell College Office of Institutional Research (2014), Columbia University (2013), Columbia University Libraries (2014a), New York University (2014a), Columbia University Libraries (2014b), Brooklyn College (2014a), Stevens Institute of Technology (2014a), Stevens Institute of Technology (2014b), The College Board (2014), New York University (2014b) University Libraries (2014), and Brooklyn College (2014b)

Table II. Characteristics of participants' institutions

for professional reading, all participants said they use at least one digital device for that purpose. Positive responses to the reading of digital texts centered on convenience and increased performance:

> P4: Depending on what I am reading I do not always print it out. I like the search functionality of digital text.

However, several participants expressed hesitance to read digital text extensively, stating:

> P2: For anything of substantial length, I prefer to read in print which is easier to flip back and forth and annotate, etc.

Despite considerable use of digital devices, some participants mentioned the disadvantages of reading digital text on mobile devices; these participants noted that the smaller size of the smartphone screen prevents them from using this technology extensively for work tasks, such as reading documents or working with spreadsheets:

> P7: I usually print out any longer articles, rather than view them on a small screen.

Other participants did indicate reading work-related texts on their smartphone screen, explaining their adaption to the use of the technology:

> P3: I got used to it.

> P5: I prefer it.

Six out of eight participants reported performing their work tasks predominantly on smartphones and desktop/laptops. Two participants reported an exclusive use of desktop computers for professional tasks, including reading, writing, working on reports, and e-mail. Participants reported extensive use of their laptops and desktops for a variety of purposes, including reading documents (four), working with spreadsheets (four), communicating/writing (four), accessing the internet (eight), using cloud storage (three), and using software (two). While participants reported higher usage of smartphones outside the workplace (seven), they also reported using smartphones for certain work tasks, such as reading/writing e-mails (eight), and managing their calendars/scheduling (four).

The major reason for choosing digital devices over more traditional media for work was convenience. Although many participants have adapted their habits for the sake of convenience, the majority of participants prefer to perform lengthy reading with print materials.

Librarians information behavior – leisure

Outside of their work environment, participants reported using largely the same devices as they used at work, including cell phones, computers, and other devices.

One participant indicated that adoption of technology within the professional environment had a direct effect on the participant's personal technology uses:

> P5: I spent a lot of time telling people that Ebrary or Browzine is the way to go, and you have to practice what you preach.

The most commonly reported information need satisfied outside of the work context was reading. Six of eight respondents said that they use digital devices during their free time to browse the internet (four), read e-books (two), and access social media (two). The two main reasons for choosing to use digital devices for leisure reading were convenience

(six) and portability (four). Under the broad umbrella of convenience, participants identified a variety of factors influencing their preferences, including the ease of use, ease and speed of access, and compatibility to their lifestyle. Here are some of the examples of participants' comments pertaining to the convenience of digital devices:

> P5: I can get anything I want really fast without going anywhere, just download it and it's there.
>
> P7: Easy to use and easy to acquire the content.

Within the portability theme, participants mentioned that they valued the ability to carry and access text on the go. One participant noted that s/he started listening to audiobooks and magazines on a smartphone after dropping print books on the bus, while another admitted:

> P5: [On a device] there's no limit to what I can get [while it is] tiresome to carry too many physical books around.

When participants chose not to read on digital devices, they remarked on the benefits of reading print media (nine). The most frequently mentioned reason to read print texts was reading comfort (seven), including the ability to browse, rest one's eyes from the glare or small size of a digital screen, and improved reading experience due to a better typeface and layout. Some comments related to the reading comfort of print included:

> P3: It's tiring to read on a device, you can't flip back and forth.
>
> P2: I need a break from a computer after working on it all day.

Additionally, one respondent (P2) stated a preference for the book as an object – "I like the physicality of the book" – while another unexpectedly rated print books as more portable than e-books, which the participant explained was due to a lack of an e-reader device.

All eight respondents said that they read e-books either for work or pleasure, though only four did both. Six respondents read e-books for leisure and another six read e-books for work or research. Two of the librarians who read e-books for work said they do so only occasionally or selectively, focussing on a specific chapter rather than reading a whole e-book. The relations between reading e-books for leisure and reading e-books for work are illustrated in Figure 2.

The reasons cited for choosing to read e-books echoed the advantages of reading on a digital device. Content accessibility (eight) and convenience (five) were commonly cited as e-book strengths. There was a sense that e-books offer a variety of content readily available at one's fingertips:

> P2: When doing work late at night [digital text] availability means that I do not have to stop because I do not have [a] crucial piece of information.

Librarians' perception of student information behavior

The analysis of the interview data regarding librarians' perception of students' information behavior revealed that librarians perceive students as heavy users of digital devices, including smartphones (14), laptops (nine), tablets (six), library desktop computers (four), and flash drives (one).

All participants believed that students use their devices to meet their academic needs (22), including writing (five), searching the library collection (five), communicating (three), taking photos of materials or results on a screen (two), and reading (two).

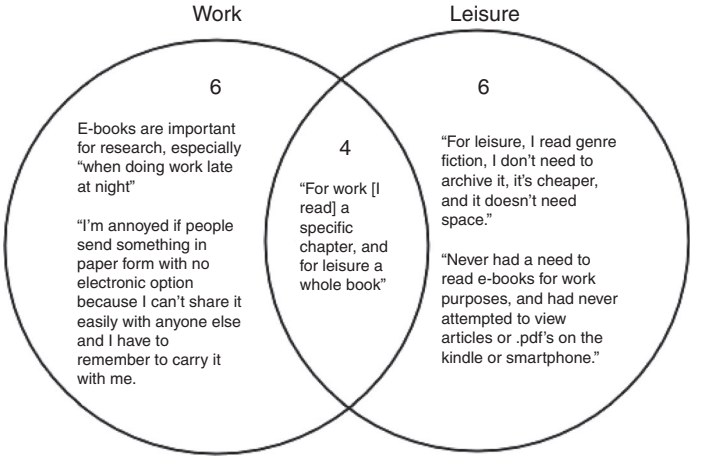

Figure 2.
Reading of e-books for work and leisure

The student activities that received single mentions included reference, viewing visual materials, collaborating, studying, and researching. Librarians identified a smartphone as the most commonly used device by students (14), and observed students using it for internet browsing (one), reading (one), and chat reference interactions (one) and other unspecified activities.

Several librarians mentioned recreational use of digital devices by students (five). As one librarian noted:

> P4: Sometimes you see them watching a YouTube video over the shoulder.

Additional recreational activities mentioned by librarians included engaging in social media (two) and playing games (one). One participant (P5) reported promotion of digital devices by library staff to both students and faculty (four), as part of a "large push to integrate technology on the campus."

In regards to the type of media used by students, participants' indicated that students use both print (nine) and digital (six) formats for their academic work. The student practice of creating print copies of the digital material was mentioned six times (e.g. "If they find articles they print them"). Textbooks were also cited as a reason students are still using print materials (two). When asked to indicate students' preference for print or digital formats for academic pursuits, librarians' answers were mixed, for example:

> P8: Surveys [of] incoming freshman's preferences revealed that they were more print-minded than we thought they were.

> P4: Students say they like print until you tell them that they can access e-books from anywhere, anytime.

Despite the fact that librarians more frequently alluded to a student preference for print than digital (seven vs four mentions, respectively), they also cited numerous reasons why students would prefer digital to print (11), including accessibility ("available immediately, free, and online") (five), usefulness for short selections of text including "chapters or journal articles" (three), convenience (two), and ubiquity (one) ("everyone is just on their phone all the time"). There was only a single mention of a reason why print might be preferable to digital, namely, that it is better for obtaining a full context. Participants also acknowledged a variety of factors influencing students' information behavior,

including the academic discipline (seven). For example, one participant (P2) indicated that science students rely almost exclusively on digital materials because the discipline "is very periodical-dependent, and periodical literature is almost all digital." Another factor was degree level (one) ("some traditional undergrads for whom reading is still somewhat of a challenge will read books"). The last factor mentioned is the availability of the information required (one). The participant citing this factor (P1) posited that users do not say they "need a source on a specific platform," they simply want the information that they are looking for, from whichever source makes that information available.

All participating librarians indicated that their library has some means of assessing students' technology use and preference. The most frequently identified tool for this purpose was a survey (six), followed by "indirect assessment" (eight), including circulation statistics, database, and computer usage software (e.g. LibQual, a program that includes a web-based survey which allows library staff to obtain and analyze feedback on library services). Additional methods for assessing student needs reported by librarians included focus groups (three) and user testing (one). Participants specifically mentioned assessments of how users find what they need, including "catalogs and discovery services" (one) and e-book assessments (one). One participant also mentioned the use of workshops to instruct students in the use of e-books and e-readers (two). The assessment of e-books and instruction in e-book technology gave rise to comments about the inadequacies of e-book platforms (two) and other weaknesses of the technology, including printing limitations (one) and inaccessibility while downloading content (one) since "the subway cuts off the connection, which is a big issue for a commuter school."

Discussion

Effects of demographic and institutional characteristics on librarians' information behavior

This study found that participants' years of professional experience had no discernable effect on their information behavior. Librarians with 20+ years of experience were using the same information technology, and in similar ways as their peers with fewer years of professional experience. While we did not find prior literature on the relationship between the length of professional experience and technology adoption, we found literature that questions the effects of users' age on technology adoption. For example, Jelfs and Richardson (2013) demonstrated that age is not a variable of technological proficiency and found no evidence of discontinuity of information technology use with age. Similar evidence can be found in the work of Charness *et al.* (2001) who found that age does not represent a limiting factor in adoption of technology as much as the social environment in which technology users live.

We also did not observe any differences in information behavior reported by librarians employed by different types of institution (private, religious, and public universities). Despite their varied demographic characteristics, all participants actively use digital devices in their workplace. Our findings suggest that common responsibilities are more likely to shape librarians' information behavior (e.g. using desktop computers or smartphones) than years of professional experience, job titles, or organizational culture. These findings are further discussed in the following sections.

Librarians' information behavior – work

Despite varied demographic characteristics, all participants actively use digital devices in their workplace. However, the extent of use, specific tasks performed, and preferences for particular devices varied. Based on participants' responses, this variance is

attributed to difference in job responsibilities, convenience, and personal preferences. For example, participants responsible for budgeting and collection development expressed a preference for using their desktop computers due to the suitability of this device for displaying large spreadsheets or multiple documents. Participants whose jobs involve communication and coordination reported extensive use of smartphones. This finding is not surprising as work demands had been previously found to influence information behavior (Ingwersen and Järvelin, 2005; Vakkari, 2003; Yuelin and Belkin, 2008). In the context of professional reading, while many participants have adapted to reading digitally, the majority of them prefer to read longer professional documents in print, a preference prevalent in previous studies (Lopatovska *et al.*, 2014; Zhang and Kudva, 2013; Woody *et al.*, 2010).

Librarians' information behavior – leisure

In most cases we found a link between participants' information behavior at work and outside of work. For some participants, the connection manifested itself in similar information behavior patterns. For example, some participants who actively read and promote digital media at work also embrace it in personal contexts. Other participants avoid reading digital texts for leisure precisely because they do it extensively at their workplace. In fact, half of our participants who reported reading digitally at work also read digital media for leisure. The other half read digital texts only for work or only for leisure. These findings can be interpreted in light of prior research that suggested a degree of information competencies transfer between professional, academic, and personal contexts (Ferran-Ferrer *et al.*, 2013; Ingwersen and Jarvelin, 2005; Yuelin and Belkin, 2008).

Within the context of personal information behavior, most of the participants chose to talk about their reading habits and preferences. Our findings indicated that specific preferences for print or digital media for reading were largely influenced by convenience, availability, and environmental factors. For example, some participants favored their digital texts for instant availability of content, space saving capabilities, portability, and built-in features. Other participants found advantages in reading paper texts, including the ability to minimize eye strain and physically navigate texts, as well as better typeface and layout. These mixed participant preferences mirror the trends in the general readership population (Zickuhr and Rainie, 2014) and the academic community (Lewis, 2008).

Our study has also confirmed the importance of situational or environmental factors in participants' information behavior (Wilson, 1999; Charness *et al.*, 2001; McFarland and Hamilton, 2006). For example, some participants identified that living in the city and working in an academic library offered them the opportunity to access a variety of digital and traditional information resources, a finding that supports information obtainability and other core notions of our field (Summit, 1993; Zipf, 1949). Basic demands of urban living, small living quarters, and lack of storage space may have also affected participants' reading habits as one of the participants (P1) mentioned "[e-content] doesn't clutter my apartment." Extensive commuting on public transport is yet another factor attributing to the participants' preference for portable media, while also influencing the demand for on the go access to content.

Librarians' perception of student information behavior

The variability of librarians' information behavior was mirrored in their perception of students' information behavior; librarians perceived students as using both digital and print materials to meet their academic needs, while also switching to leisure activities based on their needs (e.g. taking breaks to watch YouTube videos). The trends in

student information behavior identified by participants are well supported by the prior literature on technology adoption and information behavior of students. For example, a Pearson (2014) survey of college students found high number of students using laptops, smartphones, and tablets on an average school day. Other surveys of college students' information behavior found that students "do not limit themselves solely to either print or electronic media but often use both" (Foasberg, 2014, p. 705) and often print the materials they find in electronic format (Keller, 2012; Foasberg, 2014).

The most cited factor our participants identified as influencing student preference for print or digital materials was the academic field of the student, a perspective shared by other academic librarians, who find that "the interest in and demand for e-books varies between disciplines" (Vasileiou *et al.*, 2012, p. 222) and "members of the humanities and social-sciences were on the whole less satisfied with e-books than their counterparts in the hard-sciences and business" (Staiger, 2012, p. 355). Additional factors influencing students' uses of media were similar to the reasons librarians cited for their own information behavior, namely, content accessibility and convenience. These reasons are frequently mentioned in the literature on information technology adoption (Lopatovska *et al.*, 2014; Staiger, 2012; Rod-Welch *et al.*, 2013). Librarians believe students use digital texts for short segments of text, a behavior identified across all categories of academic users (Staiger, 2012) and among students specifically (Foasberg, 2014; Rod-Welch *et al.*, 2013). Interestingly, participants mentioned far fewer reasons for students to prefer print than they mentioned for themselves, perhaps due to a belief that the younger generation has fewer difficulties with reading digital media. However, previous studies of college students reported students experiencing discomfort "from reading online and poorly designed interfaces on e-book platforms" (Muir and Hawes, 2013, p. 260), and the specific problem of eye strain (Keller, 2012). Our participants' over-estimation of students' preference for digital sources is the only inconsistency we identified in student information behavior as it is perceived by participants and reported in previous literature.

All participants reported that their libraries are actively assessing student information needs and preferences. While not all participants are directly involved in data-driven assessment methods, each of them was able to draw astute insights from observations and personal interactions with students that largely fit the student information behavior trends identified in existing literature. Some participants identified specific data-driven assessments for their knowledge of student preferences, including the LibQual survey system, other survey types, focus groups, and circulation records. The fact that all interviewed librarians reported institutional assessment practices illustrates a growing assessment culture that aims to improve library offerings and ensure library support of the larger institution's goals (Besara and Kinsley, 2011; The Association of College and Research Libraries, 2014).

Conclusion

Research implications

We conducted a study to determine the factors affecting librarian information behavior and whether that behavior influences their perception of student information behavior. Our research showed that, in contrast to our proposed model, demographics had a limited effect on librarians' information behavior: while factors such as librarians' length of professional experience, and institutional affiliations did not cause variation in librarians' information behavior – their job responsibilities and personal preferences did, leading to a revision of our initial information behavior model (Figure 3).

Additionally, librarians' information behavior and preferences were found to mirror their perception of students' information behavior and preferences. Though participants reported students using similar devices for academic tasks, they did not mention reading comfort as a factor that could cause students to choose print texts, even though they heavily advocated the use of print for their own reading comfort. This finding points to the need for information professionals to stay attuned to their users' needs through professional literature and personal observations and note that all groups, even the digital natives, continue to have mixed preferences for print and digital materials. The importance of this information is further highlighted by the finding that all study participants reported the use of formal and informal assessments to determine student needs and preferences.

Overall, these results indicate that academic librarians are largely in sync with the habits of their communities, as they follow national trends in their device use, and choice of print vs e-books while demonstrating realistic and data-driven understanding of their students' informational needs and behavior. Research that explores the information behavior of academic librarians has the potential to explain what factors are affecting technology adoption in academia overall, and inform useful recommendations for optimizing collection development and facilities management for future generations, as the digital information world continues to evolve.

Limitations

Our study had a number of limitations that impaired its generalizability. One was a small research sample of eight academic librarians. However, the information gleaned from these eight individuals is detailed and very personal, a quality that has been lacking in the literature to date. Moreover, most interviewees live and work within one metropolitan area. Because their information behavior and preferences may to some degree be shaped by contextual factors, they may differ from those of information professionals in other parts of the USA. The survey sample was not balanced on some demographic factors, including gender (e.g. the ratio of female to male respondents was 3:1). Future work should investigate gender distribution among academic librarians to ensure proper gender representation in research samples. Due to the sampling technique that focussed on a type of institution and position diversity, we might have over- or under-recruited participants that share other important characteristics (e.g. technology proficiency). While our findings suggest variability of participants' characteristics and preferences, future work should consider ad hoc participant profiling in order to ensure diversity of a study sample. The represented institutions were skewed toward large research institutions, with Columbia

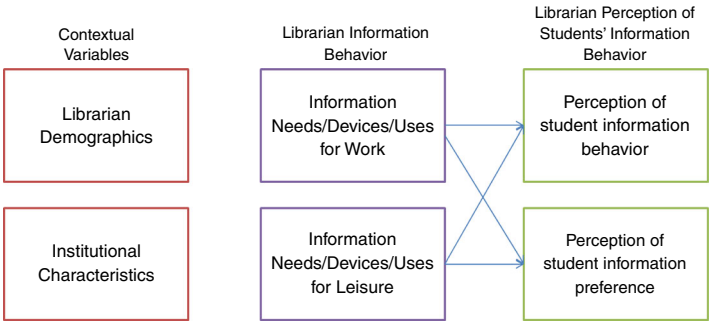

Figure 3.
Revised model of academic librarian information behavior without connection between contextual variables and librarians' information behavior

University alone supplying three respondents. The semi-structured interview style and differences in researchers' interview styles led to diverse but sometimes un-comparable reports. For example, by giving participants freedom to talk about any information behavior and devices they use outside of work, we collected data primarily on leisure reading and reading media, and to a lesser extent, on other types of information behavior or devices. Our initial findings and the limitations should inform directions of future research designs and research questions. The presented work should be viewed as an exploratory study and an initial inquiry on a much neglected topic.

Future research

Future work that seeks to understand professional information behavior of librarians should focus on the identification of the variety of contextual and situational factors that are unique to each specific job of an individual in a distinct institutional setting. Within a professional context, librarians use a wide variety of tools and media to satisfy work demands. We found that librarians employed by different academic institutions, working with populations and collections of various sizes and composition, exhibit similar information behavior trends. This finding suggests that information technology and other professional competencies do not depend on the employing institution, and academic library users can universally receive assistance from competent, information-savvy professionals in small or large, public or private universities.

Because librarians have so infrequently been asked about their personal information habits or perception of student needs, this study provides an important foundation for follow-on research. Our interview questions could be used as the skeleton for a questionnaire reaching a larger number of librarians. Future research should survey librarians serving institutions across the country, perhaps interwoven with surveys of students from those same institutions, in order to further test the accuracy of librarians' understanding of student needs and preferences. Future work can expand upon our study of academic librarian's technological use in work, leisure, and knowledge of students. Such work could further validate our research and propel a new understanding of librarians.

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Appendix. Interview questions

(1) How many years have you been an academic librarian?

(2) What is your current position?

(3) What are your primary responsibilities?

(4) For your professional use, what devices do you use the most frequently (for ex., smartphone, desktop, tablet, etc.)?

(5) What do you use them for [specifically for each mentioned device if necessary]?

(6) Do you use these devices for reading professional documents (for ex., internal reports, documents, articles)?

(7) If no: why? If yes: do you like it?

(8) For leisure, do you use the same devices?

(9) What do you usually use them for? [specify for each device if necessary]

(10) For fun, do you read on your digital devices?

(11) If no/yes: why?

(12) For either work or leisure, do you read e-books?

(13) If No/Yes: WHY?

(14) If yes: where do you get e-books/content (for ex., libraries, amazon)?

(15) What devices do you see your students using?

(16) Do you think they use them [specify devices] for their academic needs? [ask more if needed]

(17) For their academic work, do you think your students read more print or digital texts?

(18) Does your library offer more resources in print or digital formats?

(19) Do you think students prefer reading print or digital for their academic pursuits?

(20) Does your library assess students' technology use and preference? Their academic needs?

About the authors

Elizabeth McDonald is a Graduate Student at the School of Information and Library Science, Pratt Institute, New York.

Marina Rosenfield is a Graduate Student at the Palmer School of Library and Information Science, Long Island University, New York. She conducted this research project as a Non-Matriculated Student at the Pratt Institute.

Tim Furlow is a Graduate Student at the School of Information and Library Science, Pratt Institute, New York.

Tara Kron is a Graduate Student at the School of Information and Library Science, Pratt Institute, New York.

Dr Irene Lopatovska, PhD, is an Assistant Professor at the School of Information and Library Science, Pratt Institute. Her research interests include human information behavior and affective computing. She teaches research and management courses. Dr Irene Lopatovska is the corresponding author and can be contacted at: ilopatov@pratt.edu