A Comparison of E-book and Print Book Discovery, Preferences, and Usage by Science and Engineering Faculty and Graduate Students at the University of Kansas

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Abstract

The availability of science and technology e-books through the University of Kansas Libraries is growing rapidly through approval plans, e-book packages, and electronic demand-driven acquisitions. Based on informal conversations with faculty, questions still lingered as to the acceptance of books in the electronic format by faculty and graduate students in the STEM disciplines. To learn more about book format preferences, a survey was distributed via e-mail to 1,898 faculty and graduate students in science and technology at the University of Kansas. The survey included questions focused on print book use, e-book use, format preferences, and

demographics. A majority of the 357 respondents indicated a preference for print books indicating many of the oft-repeated comments about the disadvantages of reading books on a computer. Patrons using tablets were more inclined to access e-books. The survey indicated a continuing need to purchase books in both print and electronic formats, and to market the availability of e-books to University of Kansas patrons.

Introduction

E-books are ubiquitous. The number of science and technology e-books provided by the University of Kansas libraries continues to grow. There are several drivers of this trend including: the improved availability of electronic books as publishers increasingly offer a choice of either an electronic or print version of a book; choosing e-books as the default format for science and technology books purchased automatically through the approval plan; and theproliferation of e-book packages, enabling libraries to provide access to far more book titles than was previously possible. KU Libraries is relying increasingly on electronic demand driven acquisitions (DDA) for the selection of new science and technology books. While KU Libraries offers both print and electronic DDA, the instant access that electronic DDA books permits may eventually lead KU Libraries to prefer electronic DDA over print DDA which would further increase the size of the e-book collection.

This influx of e-books into the book collections of the Libraries once populated only with print books represents a shift in the culture of the book within the university. As such, it raises many questions about the potential differences in how users discover and use e-books as compared to print books. Do users prefer print or e-books and what factors may influence their preferences? Do faculty and graduate students differ in their preferences and uses of e-books? Do the different science and technology disciplines have different preferences for book format? With the aim of answering the questions above, we conducted a survey of science and engineering faculty and graduate students at the University of Kansas.

Literature Review

The scope of research on e-book usage ranges from large studies across multiple institutions to small studies within single departments. For example, JISC (2009), formerly the Joint Information Systems Committee, conducted a study across 127 universities in the United Kingdom to learn usage patterns. In contrast, smaller studies that focused only on science and engineering provided insight on the target audience. Bierman et al. (2010) and Foote and Rupp-Serano (2010) addressed faculty in the sciences in their small scale studies (less than 20 participants) at the University of Oklahoma.

Awareness of e-book availability has improved. Levine-Clark's (2006) survey with over 2,000 participants showed that 59% of users were aware the library provided e-books. Shelburne (2009) in a survey with over 1,500 respondents showed that 55% of the faculty, students, and staff were aware of library e-book availability. Awareness on campus was higher in 2011 for Zhang and Beckman and in 2012 for Cassidy et al. with respectively 74% and 62% of library

users aware of e-book availability. Most recently, Muir and Hawes (2013) reported from 61 responses of students and staff that 95% of participants had used e-books previously.

Users discover e-books primarily through the library catalog (Nariani 2009; Levine-Clark 2006). Once discovered, e-books are used differently than print books. Users tend to read only a few chapters rather than the entire book (Levine-Clark 2006; Jamali et al. 2009; Nariani 2009; Shelburne 2009). E-books are used as reference books to find discreet answers (Shelburne 2009; Bierman et al. 2010; Staiger 2012). While participants in the study by Muir and Hawes (2013) showed careful reading of longer passages for more than discreet answers, students still did not read e-books cover to cover.

Levine-Clark (2006) established that users adjust format preference depending on the need. Foote and Rupp-Serano (2010) found that researchers in the geosciences preferred print during field work. Nariani (2009) noted that print was preferred for careful, close reading such as historical perspectives while the electronic format was preferred for content such as statistics. The Ithaka S+R US Faculty Survey 2012 found a preference for the print format as well (Housewright et al. 2013).

Hurdles to using e-books beyond discovery and preference include poor user interfaces, login requirements, and digital rights management issues. In addition, the difficulty in downloading or printing portions of an e-book was cited as a problem by Cassidy et al. (2012) and Shelburne (2009). While interface issues have improved over time, Walters (2013) encouraged librarians to work with publishers to find a model that works for users.

Disadvantages of e-books also include difficulty in simultaneously referring to multiple texts. Researchers that need to refer to multiple texts may prefer print (Shelburne 2009; Cassidy et al. 2012; Muir and Hawes 2013). Additionally, accessibility issues were evident such as when reading sessions timed-out for inactivity before the user was finished reading (Muir and Hawes 2013). Cassidy et al. (2012) noted accessibility issues with respect to functionality on different devices. In addition they noted that e-book benefits vary for readers with disabilities providing advantages for some while presenting hurdles for others.

Reading technical content in the e-book format takes more time than reading print (Daniel and Woody 2013; Muir and Hawes 2013). Muir and Hawes (2013) noted that students lacked context when landing on an unfamiliar page resulting from a search within text function. Daniel and Woody (2013) reported distractions when reading from a screen where one has access to e-mail and social media.

Bierman et al. (2010) identified discomfort of reading on a desktop or laptop as a problem, as did Muir and Hawes (2013). Cassidy et al. (2012) had a related observation: 82% of the user group that did not use e-books would be more likely to use them if they had a more convenient device such as an iPad or Nook.

The studies reported here reflect large user surveys (Levine-Clark 2006; JISC 2009; Shelburne 2009; Housewright 2013) and smaller surveys of less than 20 respondents that provided some science-specific insight (Bierman et al. 2010; Foote and Rupp-Serano 2010). Our study at the

University of Kansas is distinguished from the others in that it is a large study of over 350 survey respondents limited to the science and engineering faculty, graduate students, and post-doctoral researchers.

Methods

In the Fall of 2012 all faculty and graduate students and selected postdoctoral researchers in science and technology disciplines at the University of Kansas were sent an e-mail message with a link to an online survey on their use of and preferences for print and e-books. The survey was distributed using SurveyMonkey. Two weeks after the first e-mail message all potential respondents were sent a follow up e-mail message to encourage those who had not yet responded to complete the survey. The departments surveyed are listed in Table 1, at the end of this section.

The survey consisted of questions focused on print book use, e-book use, preference for print or e-books, and demographics. Questions on print book use included how often they were used, the portion of a book typically read, sources for identifying print books, and purposes for their use. The questions on e-book use included how often they were used, what portion was typically read, sources for identifying e-books, factors which discourage their use, advantages of electronic format, and disadvantages of electronic format. Respondents were asked whether they preferred e-books or print books. Demographic questions asked respondents to identify their affiliation to KU (faculty, graduate student, postdoctoral researcher) and their department.

The survey as delivered on e-mail to the graduate students and faculty is included as the Appendix.

Table 1: List of University of Kansas departments surveyed

Aerospace Engineering (School of Engineering)
Bioengineering (School of Engineering)
Chemical & Petroleum Engineering (School of Engineering)
Chemistry
Civil, Environmental & Architectural Engineering (School of Engineering)
Ecology & Evolutionary Biology
Electrical Engineering & Computer Science (School of Engineering)
Engineering Management (School of Engineering)
Geography
Geology
Mathematics
Mechanical Engineering (School of Engineering)
Medicinal Chemistry (School of Pharmacy)
Molecular Biosciences
Pharmaceutical Chemistry (School of Pharmacy)
Pharmacology & Toxicology (School of Pharmacy)
Pharmacy Practice (School of Pharmacy)

Physics & Astronomy
Speech-Language-Hearing

Results

Survey links were e-mailed to 1,898 faculty, graduate students (masters and PhD), and selected postdoctoral researchers in the science and technology departments at the University of Kansas. Three hundred and fifty-seven surveys were returned resulting in a response rate of 19%. The division of responses by status was 32% faculty, 58% graduate students, and 10% postdoctoral researchers. The highest return rates were from the Chemistry Department, Molecular Biosciences, and Electrical Engineering & Computer Science.

Usage of print books

Approximately 50% of respondents indicated print books are used *weekly* or *daily*, 20% *monthly*, and 31% *rarely* or *never*. Responses from faculty and graduate students were comparable in the monthly to daily ranges with slightly higher usage from the faculty. Differences diverged more under rarely used with 20% indicated by faculty and 28% by graduate students. If a print book is used, nearly a third indicated a chapter or less is consulted, another third indicated two to three chapters, with more than a third (38%) using more than three chapters or the whole book.

How do our users identify print books to read? Respondents could select multiple sources including the library catalog, databases, Google, publishers' web sites, online bookstores, and more (Figure 1). The library catalog is used the most to identify print books, followed by Google, citations, and colleagues. Two respondents commented that they referred to their own personal collections. Some of the major differences in responses between graduate students and faculty included a higher usage of the library catalog by graduate students (74% vs. 61%) whereas faculty indicated a higher usage of databases, publishers' web sites and citations in identifying print books.
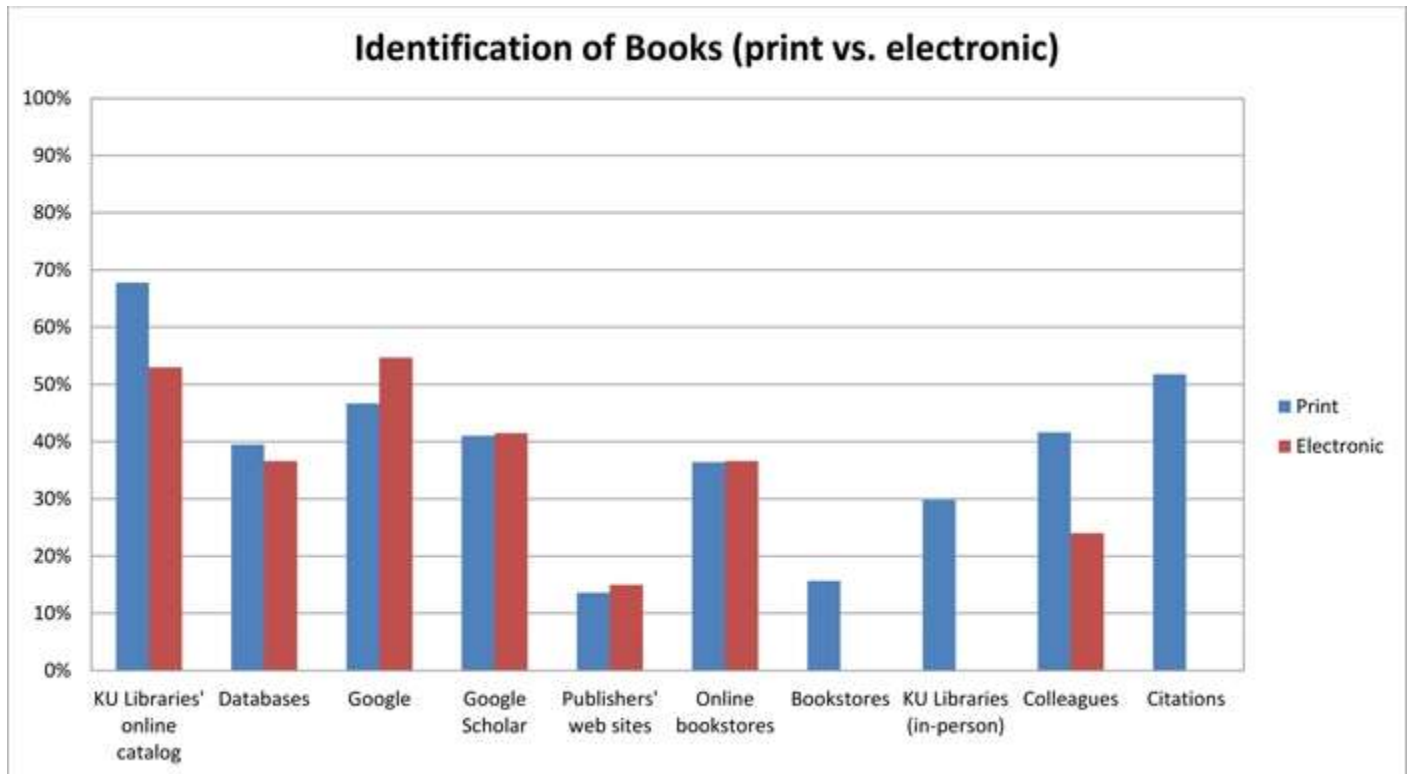
Figure 1

Use of e-books

Similar questions were asked regarding the use of electronic books. A smaller percentage (33%) of respondents access e-books weekly or daily, 20% monthly, and a much higher percentage (48%) rarely or never use e-books. As to the portion of an e-book used by those who answered the question, a higher percentage (43%) consult one chapter or less, 29% use two to three chapters, and approximately 27% use more than three chapters or the whole book (Figure 2). Google (55%) edged out the library catalog (53%) in locating e-books. Both databases and online bookstores received a 36% response. As with the identification of print books, graduate students used the library catalog more than faculty to locate e-books (58% to 41%).

What devices are used to read e-books? Sixty percent of the respondents use a desktop or laptop followed by 22% on an e-book reader or tablet. Sixteen percent print portions to read. Several respondents commented that they use variations of all potential responses. E-books are used mainly for the purpose of research (84%) and reference (62%), but instruction (34%) and leisure (40%) received significant tallies. More faculty (31%) use e-book readers or tablets to read e-books than do graduate students (18%).

Preferences

The question of most interest was, "Do you prefer e-books or print books?" Sixty-one percent of the respondents prefer print while 39% prefer electronic. Three percent indicated no preference for either format. The percentage responses between faculty and graduate students were nearly

the same. Thirty-seven percent of faculty and 38% of graduate students preferred e-books while 63% of faculty and 62% of graduate students preferred print books. As for preference by school and department, the School of Pharmacy had the highest preference for e-books (59%) followed by Molecular Biosciences (52%). Physics & Astronomy had the highest preference for print books (80%) followed by Mathematics and the School of Engineering (both 73%) and Ecology & Evolutionary Biology (72%). (As noted in Table 1, the School of Pharmacy has four departments: Medicinal Chemistry; Pharmaceutical Chemistry; Pharmacology & Toxicology; and Pharmacy Practice. The School of Engineering includes seven programs: Aerospace Engineering; Bioengineering; Chemical & Petroleum Engineering; Civil, Environmental & Architectural Engineering; Electrical Engineering & Computer Science; Engineering Management; and Mechanical Engineering.)
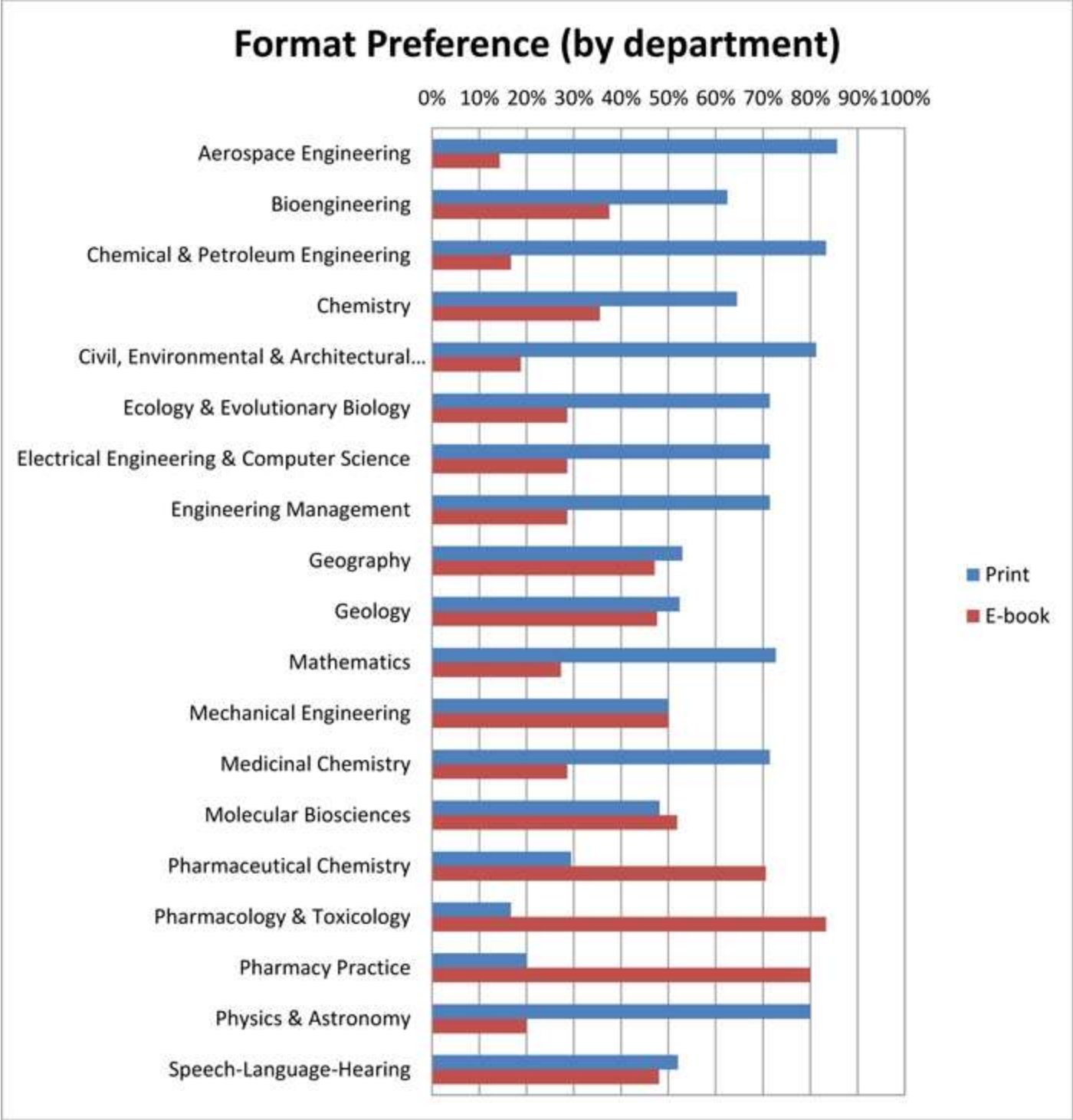
Figure 2

The format preference question prompted many respondents to offer written comments. Many of those comments began with the qualifying expression "it depends." Each format is acceptable but in certain situations. The selection can depend on the application, whether for leisure or for research or a quick reference or in-depth reading.

Forty-five percent indicated a *preference for print books* in response to this question: "What discourages you from using e-books?" The respondents could select multiple options in response to the questions. Forty-three percent selected *relevant e-books are not available,* 30% chose *difficulty finding them*, and 15% selected *not aware that e-books are available*. A fair number of responses indicated limitations on copying and printing, viewing images and graphs, and difficulty using the interface. Added comments were in agreement with the literature: difficult to read on a computer screen; inability to flip pages; inability to download; and difficulties with annotating and highlighting.

Responses to the question "What are the disadvantages of e-books" were very similar and emphasized even more the interface and technical restrictions. Graduate students (70%) and faculty (71%) were in agreement that the biggest disadvantage is the difficulty of reading on a screen. A higher percentage of desktop or laptop users (67%) indicated difficulty of reading a screen as a disadvantage than did e-book reader or tablet users (55%). A significant percentage of faculty (46%) and graduate students (40%) also selected *require a computer or other device to read* as a disadvantage of e-books.

The e-book format does have its advantages. Faculty (75%) and graduate students (82%) agreed that *available from anywhere at any time* is the major advantage. Being able to search the full text of a book was the second highest selection followed by e-books being environmentally friendly. As to how e-books are primarily read, 60% selected desktop or laptop and 41% of those respondents rarely use e-books with the remaining percentage spread out over daily (14%), weekly (21%), and monthly (23%). Of the 22% using e-book readers or tablets, the usage was somewhat different with 28% daily, 21% weekly and 23% monthly. Respondents using e-book readers or tablets are more likely to read a whole book on these devices (68%) as opposed to individuals using a desktop or laptop (28%). Desktop or laptop users are more likely to read 1-3 chapters of an e-book. A large percentage (80%) of those who prefer to print from e-books before reading selected print books as a preference.

Those who primarily read e-books using e-book readers or tablet computers as a group are different from those who primarily read e-books using a desktop or laptop computer, a mobile phone, or print-outs. When we compare the e-book reader or tablet computer group to a group formed from combining those who primarily read e-books any other way, differences emerge between the two groups. Only 50% of the e-book reader or tablet computer group report that reading on a screen is difficult or uncomfortable, as opposed to 68% of the group who primarily read e-books using other means. A larger percentage of the e-book reader or tablet computer group reported reading e-books daily, 29% compared to 14% of the other group. In addition, 26% of the e-book or tablet computer group reported typically reading the entire e-book when an e-book is used, as opposed to 4% of the other group. Those who typically read e-books using e-book readers or tablets are more likely to prefer e-books over print books; 53% of these respondents preferred e-books as compared to 41% of the respondents who typically read e-books other ways.

Discussion

The sources respondents reported using for finding e-books suggest that libraries should be doing more to facilitate the discovery of e-books in their collections. Common sources for identifying e-books such as Google, online bookstores, and publishers' web sites generally do not indicate the book's availability in the user's local library. Only 53% of respondents in our survey reported using the KU online catalog to identify e-books. Considering that the KU Libraries owns thousands of e-books and loads thousands more e-book records into our catalog which makes e-books readily available upon request, researchers not searching the catalog are missing an important avenue of e-book discovery and access. When asked what discouraged them from using e-books, 43% of KU graduate students and faculty indicated that relevant e-books are not available, 15% indicated that they were not aware that e-books were available and 30% indicated a difficulty in finding them. Selected comments include: "I prefer e-books to physical books, but generally cannot find them" and "I would be happy to use e-books if more were available in my area." These statistics and comments further suggest that librarians could do more to publicize the availability of e-books and the use of the library catalog for finding them. Since the creation of this survey the University of Kansas has launched a web scale discovery tool (Primo) which provides an additional avenue for e-book discovery. Future research should address the effectiveness of this tool.

Users reported some obstacles to using e-books that are controlled by e-book vendors such as requiring an online profile to fully use their content and limitations on printing or copying. Librarians and library associations can advocate for fewer limitations on printing or copying and for the elimination of online profiles for content use. Users do not want limitations on printing or copying, and do not want an added step of creating online profiles in order to access special features. Two respondents made related comments: "One of the most frustrating things is the lack of a common platform" and "The online software for reading books is far from appealing."

More respondents (61%) preferred print books to e-books (39%). With sizeable preferences for each format, how is a library to respond? Given the substantial numbers of researchers with each preference, the library would do well to include books in each format so that researchers with either preference will have access to at least some books in their preferred format. Ideally the user of a book should decide the format. However, this would lead to the library's collection containing duplicate copies of books in order to have the format the user prefers. Such duplication is not practical at a large scale given budgetary constraints. Without duplication to meet format preferences, users inevitably are left to read books in the format they do not prefer.

Related respondent comments include:

"...I generally seem to remember what I read on paper much better than what I read on a computer screen. Somehow by recalling a physical location in a book I remember the material, but that concrete connection is lost when simply scrolling a browser window."

"I just never feel like I remember as much from them (it seems like all of the on-screen "pages" just blur into one -- especially when they don't have/use page numbers)."

"...When I use a book it is usually an advanced exposition of a broad area of research results. I never read it through, but go to various chapters and within those chapters delve very deeply. In

order to do this --- terminology etc. --- I need to flip back to other sections of other chapters and gradually a clear picture appears of what is going on. Having my attention caught by things closely related which I might not have known to search for is an important aspect of this. Perhaps e-readers are getting better at approximating the experience. But it is this flipping back and forth (and ability to place bookmarks in the sections I am flipping among) that is most important to me in a physical book used for research."

Besides the need to purchase e-books to support the 39% of researchers who prefer the electronic format, there are other reasons libraries purchase e-books. Books are increasingly published in electronic format, and some titles are only offered as e-books. A library that does not offer e-books increasingly puts itself in the position of not being able to offer its users the content they require. As e-books become even more prevalent, a library's previous experience in offering e-books enables them to develop the expertise to offer e-books adeptly in the future. Libraries may provide access to large numbers of e-books offered as packages for heavily discounted prices. With the advent of demand-driven acquisitions, libraries can offer researchers instant access to the books they require by loading e-book records into the online catalog. Demand-driven acquisition of e-books also allows libraries to only purchase the books researchers actually use. In addition, by offering e-books, libraries enable their users to partake of the advantages that the electronic format provides, such as instant availability 24/7 from anywhere, full-text search capabilities, and cut and paste options.

According to our respondents, the greatest disadvantage of the use of e-books is the discomfort or difficulty of reading them on a screen. Those who read using an e-book reader or tablet were less likely to indicate that reading on a screen was uncomfortable or difficult. In fact, the majority (52%) of the respondents who primarily read e-books on an e-book reader or tablet preferred e-books over print books. This suggests that as tablets and e-book readers gain popularity, difficulty and discomfort in reading e-books may decrease. Some libraries have addressed this issue by providing iPads or other tablets for checkout. One respondent commented that e-books would be best with a tablet computer.

Conclusion and Recommendations

A number of answers to the initial questions posed at the beginning of this research have been found. Many users still prefer print over electronic. No major differences were found between the preferences of graduate students and faculty. However, there were noticeable differences between departments. In particular, departments within the School of Pharmacy tended to prefer e-books more than others. One explanation for this difference may be the curricular requirement to use the e-book collection, e.g. AccessPharmacy.

E-books are here to stay, yet our findings suggest that the e-book offerings of libraries and publishers may be ahead of many users' stated preferences. These preferences are influenced by concerns over "readability," the varying quality of user platforms, and difficulties in discovery of e-books.

This research has spawned many new questions that may be ripe for future research. Are researchers making distinctions between recreational and professional reading? (Future studies

should control for this variable). How does the use of e-books relate to an individual researcher's use of print books -- is there a corresponding decrease? In addition, a study that integrates resource usage by discipline and user preferences could be valuable in order to determine whether stated preferences are consistent with actual resource usage.

Acknowledgements

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Supplemental Materials

The raw data file for this survey, from SurveyMonkey, is available in the University of Kansas institutional repository, ScholarWorks. The permanent URL for this file is: http://hdl.handle.net/1808/12537

Appendix

This survey was delivered by e-mail to graduate students, post-docs and faculty in science and engineering departments at the University of Kansas in October 2012. View survey (PDF).