Adoption of E-Book Readers among College Students: A Survey

Nancy M. Foasberg

To learn whether e-book readers have become popular among college students, this study surveys students at one large, urban, four-year public college. The survey asked whether the students owned e-book readers and if so, how often they used them and for what purposes. Thus far, uptake is slow; a very small proportion of students use e-readers. These students use them primarily for leisure reading and continue to rely on print for much of their reading. Students reported that price is the greatest barrier to e-reader adoption and had little interest in borrowing e-reader compatible e-books from the library.

Portable e-book readers, including the Amazon Kindle, Barnes and Noble Nook, and the Sony Reader, free e-books from the constraints of the computer screen. Although such devices have existed for a long time, only recently have they achieved some degree of popularity. As these devices become more commonplace, they could signal important changes for libraries, which currently purchase and loan books according to the rights and affordances associated with print books. However, these changes will only come about if e-book readers become dominant.

For academic libraries, the population of interest is college students. Their use of reading formats drives collection development practices, and any need to adjust to e-readers depends on whether students adopt them. Thus, it is important to research the present state of students' interest in e-readers. Do they own e-readers? Do they wish to purchase one? If they do own them, do they use them often and regard them suitable for academic work?

The present study surveys students at Queens College, part of the City University of New York, to gather information about their attitudes toward and ownership of e-books and e-book readers. Because only Queens College students were surveyed, it is not possible to draw conclusions about college students in general. However, the data do provide a snapshot of a diverse student body in a large, urban, four-year public college setting.

The goal of the survey was to learn whether students own and use e-book readers, and if so, how they use them. In the midst of enthusiasm for the format by publishers, librarians and early adopters, it is important to consult the students themselves, whose preferences and reading habits are at stake. It is also vital for academic libraries to understand whether and how students are using e-book readers to respond appropriately. As new media formats emerge, libraries must avoid both extremes: uncritical, hype-driven adoption of new formats and irrational attachment to the status quo.

▌Research Context

Recently introduced e-reader brands have attracted so much attention that it is sometimes difficult to remember that those currently on the market are not the first generation of such devices. The first generation was introduced, to little fanfare, in the 1990s. Devices such as the SoftBook and the Rocket E-Book reader are well documented in the literature, but were unsuccessful in the market.[1] The most recent wave of e-readers began with the Sony Reader in 2006 and Amazon's Kindle in 2007, and thus far is enjoying more success. Barnes and Noble and Borders have entered the market with the Nook and the Kobo, respectively, and Apple has introduced the iPad, a multifunction device that works well as an e-reader.

Amazon claims that e-book sales for the Kindle have outstripped their hardcover book sales.[2] These numbers may reflect price differences, enthusiasm on the part of early adopters, marketing efforts on the parts of these particular companies, or a lack of other options for e-reader users because the devices are designed to be compatible primarily with the offerings of the companies who sell them. Nevertheless, they certainly indicate a rise in the consumption of e-books by the public, as the dramatic increase in wholesale e-book sales bears out.[3] In the meantime, sales of the devices increased nearly 80 percent in 2010.[4]

With this flurry of activity have come predictions that e-readers will replace print eventually, perhaps even within the next few years.[5] Books have been published with such bold titles as *Print is Dead*.[6] However, despite the excitement, e-readers are still a niche market.

According to the 2010 Pew Internet and American Life survey, 5 percent of Americans own e-book readers. Those who do skew heavily to the wealthy and well-educated, with 12 percent having an annual household income of $75,000 or more and 9 percent of college graduates owning an electronic book reader. This suggests that e-book readers are still a luxury item to many.[7]

To academic librarians, it is especially important to know whether e-readers are being adopted by college students and whether they can be adapted for academic use. E-readers' virtues, including their light weight, their ability to hold many books at the same time, and the speed with which materials can be delivered, could make them very attractive to students. However, they have many limitations for academic work. Most do not provide the ability to copy and paste into another document, have

Nancy M. Foasberg (nfoasberg@qc.cuny.edu) is Humanities Librarian, Queens College, City University of New York, Flushing, New York.

limited note-taking capabilities, and rely on navigation strategies that are most effective for linear reading.

The format also presents many difficulties regarding library lending. Many publishers rely on various forms of DRM (digital rights management) software to protect copyrighted materials. This software often prevents e-books from being compatible with more than one type of e-book reader. Indeed, because e-book collections in academic libraries predate the emergence of e-book readers, many libraries now own or subscribe to large e-book collections that are not compatible with the majority of these devices. Furthermore, publishers and manufacturers have been hesitant to establish lending models for their books. Amazon recently announced that they would allow users to lend a book once for a period of fourteen days, if the publisher gave permission.[8] This very cautious and limited approach speaks volumes about publishers' fears regarding user sharing of e-books.

Several libraries have developed programs for lending the devices,[9] but there is no real model for lending e-books to users who already own e-readers. A service called Overdrive also provides downloadable collections, primarily of popular fiction, that can be accessed in this manner. However, the collections are small and are not compatible with all devices, including the most popular, the Kindle. In the United Kingdom, the Publisher's Association has provided guidelines under which libraries can lend e-books, which include a requirement that the user physically visit the library to download the e-book.[10] Clearly, we do not currently have anything resembling a true library lending model for e-reader compatible e-books, especially not one that takes advantage of the format's strengths.

Despite the challenges, it is clear that if e-book readers are enthusiastically adopted by students, libraries will need to find a way to offer materials compatible with them. As Buczynski puts it, "Libraries need to be in play at this critical juncture lest they be left out or sidelined in the emerging e-book marketplace."[11] However, because the costs of participating are likely to be substantial, it is very important to discover whether students are indeed adopting the hardware. Few studies have focused on spontaneous student adoption of the devices, although several mention that when students were introduced to e-readers, they appeared to be unfamiliar with the devices and regard them as a novelty. However, e-readers have become more prevalent since many of these studies were conducted. Thus this study surveys students to find their attitudes toward e-book readers.

Literature Review

Only a few studies have attempted to quantify the popularity of e-readers. As mentioned above, the 2010 Pew Foundation survey, *Internet and American Life*, found that e-readers were luxury items owned by the well educated and well off. In the survey, 5 percent of respondents reported owning an e-reader.[12] In the *ECAR Study of Undergraduate Students and Information Technology*, 3.1 percent of undergraduate college students reported owning an e-book reader, suggesting that college students are adopting the devices at a slower rate than the general population.[13] Commercial market research companies, including Harris Interactive and the Book Industry Study Group, also have collected data on e-book adoption. The Harris Interactive poll found that 8 percent of their respondents owned e-readers, and that those who did claimed that they read more since acquiring it. However, as a weighted online poll with no available measure of sampling error, these results should be considered with caution.[14] The Book Industry Study Group survey, although it was sponsored by several publishers and e-reader manufacturers, appears to use a more robust method. This survey, *Consumer Attitudes toward E-Book Reading*, was conducted in three parts in 2009 and 2010. Kelly Gallagher, who was responsible for the group that conducted the study, remarks that "we are still in very early days on e-books in all aspects—technology and adoption." Although the size of the market has increased dramatically, the survey found that almost half of all e-readers are acquired as a gift and that half of all e-books "purchased" are actually free. However, among those who used e-books, about half said they mostly or exclusively purchased e-books rather than print. The e-books purchased are mostly fiction (75 percent); textbooks comprised only 11 percent of e-book purchases.[15]

Much of the literature on e-book readers consists of user studies, which provide useful information about how readers might interact with the devices once they have them in hand but provide no information about whether students are likely to use them of their own volition. However, these studies are of interest because they hint at reasons that students may or may not find e-readers useful, important information for predicting the future of e-books.

User studies have covered small devices, such as PDAs (personal data assistants);[16] first-generation e-readers, such as the Rocket eBook;[17] and more recent e-book readers.[18] The results of many recent e-reader user studies have been very similar to studies on the usability of the first generation of e-book readers: the devices offer advantages in portability and convenience but lack good note-taking features and provide little support for nonlinear navigation.

Amazon sponsored large-scale research on academic uses of e-book readers at universities, such as Princeton, Case Western Reserve University, and the University of Virginia,[19] while other universities, such as Northwest Missouri State University,[20] carried out their own projects

with other e-readers. Other types of programs, most notably Texas A&M's Kindle lending program,[21] and many academic focus groups have also contributed to our knowledge of how students use e-readers.

Users in nearly every study have praised the portability of these devices. This can be very important to students; users in one study noted that the portability of reading devices allowed them to "reclaim an otherwise difficult to use brief period,"[22] and in another, students were able to multitask, doing household chores and studying at the same time.[23] Adjustable text size and the ability to search for words in the text have also been popular among students, as has the novelty value of these devices. Environmental concerns surrounding heavy printing have also been cited as an advantage of e-readers.[24]

However, the limitations of these devices, some of which are severe in an academic setting, also have been noted. The comments of students at Gettysburg College are typical: they liked the e-readers for leisure reading, but found them awkward for classroom use.[25] Lack of note-taking support was an important drawback for many students. Waycott and Kukulska-Hulme noted that students were much less likely to take notes while reading with a PDA than they were with print.[26] A study at Princeton found that the same was true of students using the Kindle,[27] and students at Northwest Missouri State University said they read less with an e-textbook than with a traditional one, although they did not report changes in their study habits.[28] Despite the ability of many devices to search the text of a book, users in many studies also disliked the inability to skim and browse through the materials as they would with print.[29] Interestingly, this complaint appeared in studies of all types of e-readers, even those with larger screens. Students, in a recent study with the Sony Reader and iPod Touch, noted that these devices did a poor job of supporting PDFs, a standard format for online course materials. The documents were displayed at a very small size and the words were sometimes jumbled.[30] Whether these drawbacks will prevent students from adopting e-book readers remained to be seen. Library and information science (LIS) students in a small, week-long study reiterated the problems found in the above studies, but nevertheless found themselves using e-readers extensively and reading more books and newspapers than they had before.[31]

Several of these user studies hint that e-readers are not currently commonplace as far as users often seemed to regard the devices with surprise and curiosity. In some studies, while users were initially attracted to the novelty value of the devices, their enthusiasm dimmed after using the devices and discovering technical problems and limitations.[32] One author describes e-readers as "attention getters, but not attention keepers."[33] A study in early 2009, in which students were provided with e-readers, notes that "for the majority of the participants, this was their first encounter with an e-book reader."[34] While this is mere anecdote, it, along with the survey results noted above, raises the question of how popular the device really is on college campuses.

Finally, a third group of studies attempts to predict the future of e-readers and e-books. Even before the introduction of e-readers, some saw e-books as the likely future of academic libraries.[35] More recently, one report discusses the likelihood of and barriers to e-book adoption. This article concludes that "barriers to e-book adoption still exist, but signs point to this changing within the next two to five years. That, of course, has been said for most of the past 15 to 20 years."[36] Still, Nelson points out that technologies can become ubiquitous very quickly, using the iPod as an example, and warns libraries against falling behind.[37] Yet another report puts e-books in the two-to-three-year adoption range and claims that e-books "have reached mainstream adoption in the consumer sector" and that the "obstacles have . . . started to fall away."[38]

Method

The e-reader survey was conducted as part of Queens College's Student Technology Survey, which also covered several other aspects of students' interactions with technology. The author is grateful to the Center for Teaching and Learning (in particular, Eva Fernández and Michelle Fraboni) for graciously agreeing to include questions about e-readers in the survey and providing some assistance in managing the data. This survey, run through Queens College's Center for Teaching and Learning, was hosted by SurveyMonkey and was distributed to students through their official e-mail accounts. Participants were offered a chance to win an iPod Touch as an incentive, but students who did not participate also were offered an opportunity to enter the iPod drawing. The survey was available between April and June 2010. All personally identifying information was removed from the responses to protect student privacy.

Rather than surveying the entire population about e-readers and e-books, the survey limited most of the questions to students with some experience with the format. Of the students who responded to the survey, only 63 (3.7 percent) used e-readers. However, 338 more students identified themselves as users of e-books but did not use e-readers. All other students skipped past the e-book questions and were directed to the next part of the survey.

The questions about e-readers fell into several categories. The students were asked about their ownership of devices and which devices they planned to purchase in the future. While they might of course change their minds about future purchases, this is a useful way of measuring whether students regard the devices as desirable.

Respondents were also asked about their use of e-books. This category includes questions about what kind of reading students use e-books for, how much of their reading uses e-books, and where they are finding their e-books. It was important to learn whether students considered e-book readers appropriate for academic work, and whether they considered the library a potential source for e-books.

Finally, to assess their attitudes toward e-book readers, students were asked to identify the main benefits and drawbacks of e-book readers. Several possibilities were listed, and students were asked to respond to them along a Likert scale. A field was also included in which students could fill in their own answers.

After 643 incomplete surveys were eliminated, there were 1,705 responses from Queens College students. This is about 8 percent of the Queens College student body. E-mail surveys always run the risk of response bias, especially when they concern technology. However, students who responded were representative of Queens College in terms of sex, age, class standing, major, and other demographic characteristics.

The results were compared using a chi-squared test with the level of significance set at 0.05. In some cases, there were too few respondents to test significance properly and comparisons could not be made.

Please see appendix for the e-reader questions included in the survey instruments. They will be referred to in more depth throughout this article.

Survey Limitations

The survey results may not be generalizable because of the survey's small sample size. In particular, the 63 respondents who use e-book readers may not be representative of student e-reader owners in general. The survey also relies on self-reporting; no direct observation of student behavior took place.

Students who do use e-readers may be more comfortable with technology and more likely to respond to e-mail surveys. However, the sample is representative for Queens College students, and the percentage of students who own e-book readers is close to the national average at the time the survey was taken (5 percent).[39]

Since only Queens College students were surveyed, the results reflect the behavior and attitudes of students at a single large, four-year public college in New York City. The results do not necessarily reflect the experience of students at other types of institutions or in other parts of the United States. The other parts of the technology survey show that QC students are heavy users of technology, so they may adopt new technologies such as e-book readers more quickly than other students. To understand the attitudes of students in general, similar surveys should be taken across many campuses in several demographically different areas.

Researching e-readers is inherently difficult because the landscape is changing very quickly. Since the survey began, Apple's iPad became available, prices for dedicated e-readers have dropped dramatically, publishers have become more willing to offer content electronically, and Amazon has released a new version of the Kindle and has begun taking out television advertisements for it. Without a follow-up survey, it is impossible to know whether these events have changed student attitudes.

Results and Discussion

E-Reader Adoption

Of the 1,705 students who responded to the survey, 401 say that they read e-books (table 1). Most students (338) who use e-books read them on a device other than an e-reader, but 63 say they use a dedicated reader for e-books (table 2). However, when students were asked about the technological devices that they own, only 56 selected e-book readers. Perhaps the seven students who use e-book readers but don't report owning one are sharing or borrowing them, or perhaps they are using a device other than the ones enumerated in the question. Aside from table 3, which breaks down the e-reader brands that students own, the following data will be based upon the larger sample of 63 students.

The students who read e-books on another device were asked whether they planned to buy an e-reader in the

Table 1. E-book use among respondents

E-book use	Number of respondents
Read e-books	401 (23.5%)
Do not read e-books	1262 (74.0%)
Don't know what an e-book is	42 (2.5%)
Total	*1705 (100%)*

Table 2. Devices used to read e-books among e-book readers

Device used	Number of respondents (% of e-book users)
Dedicated e-reader	63 (15.7)
Other device	338 (84.3)
Total	*401 (100)*

future. The majority had no immediate plans to buy one, with those who said they did not plan to acquire one and those who did not know combining for 62.43 percent. 23.67 percent planned to buy one either within the next year or before leaving college, and the remaining 13.91 percent planned to acquire an e-reader after graduating.

Despite ergonomic disadvantages, many more students are using e-books on some other device, such as a computer or a cell phone, than are loading them on e-readers. Furthermore, a large percentage of these students do not plan to buy an e-book reader. The factors preventing these students from buying e-readers will be covered in more detail in the "Attitudes toward E-readers" section below. However, it seems likely that a major factor is price, identified by both e-reader owners and non-owners as the greatest disadvantage of these devices.

When asked to list the devices they owned, 56 students named some type of e-book reader. Among these, the Amazon Kindle was the most popular (table 3).

As expected, e-readers have yet to be adopted by most students at Queens College. At the time of this survey, less than 4 percent of respondents owned one. While the rest of the survey shows that these students are highly wired—82 percent own a laptop less than five years old and 93 percent have high-speed Internet access at home—this has not translated to a high rate of e-reader ownership.

Although Apple's iPad, a tablet device that functions as an e-reader among other things, was not yet released at the time of the survey, it may see wider adoption than the dedicated devices. When the survey was originally distributed, this device had been announced but not yet released. Overall, 8 percent of students expressed a desire to buy an iPad, many more than reported owning an e-reader. Curiously, the e-reader owners reported that they planned to buy an iPad at the same rate as the other students. It is not clear whether these students plan to replace their e-reader or use multiple devices. In either case, while the arrival of the iPad and other tablet devices seems likely to increase the number of students carrying potential e-reading devices, some of its adopters will probably be students who already own e-readers.

Not surprisingly, students who used e-readers tended to be early adopters of technology in general (table 4).[40] Compared to the general pool of respondents, they were much more likely to like or love new technologies and much less likely to describe themselves as neutral or skeptical of them. In a chi-squared test, these differences were significant at a level of 0.001.

Although e-reading devices have existed since the 1990s, the newest, most popular generation of them is so recent that people who own one now are early adopters by definition. Compared to the rest of the survey respondents, both e-reader owners and other e-book users were much more likely to identify as early adopters of technology in general. Given this trend, the adoption rate of e-readers among students may slow once the early adopters are satisfied.

Uses of E-Books

Students who used an e-book reader were asked how much of their reading they did with it and whether they used it for class, recreational, or work-related reading (table 5). Students without e-readers were asked the same questions about their use of e-books. While it is likely that students who use e-book readers continue to access e-books in other ways, this distinction was made because this survey was designed to study their use of e-readers specifically. Because e-reader users were not asked about their use of e-books in other formats, it is not clear whether their habits with more traditional e-book formats differ from those of other students.

Fewer than half the e-reader users in the study used the device for two-thirds of their reading or more. In the table below, students who did all their reading and those who did about two-thirds of their reading with e-books are combined, because so few claimed to read e-books exclusively. Three students with e-readers and

Table 3. E-reader brands owned by students

Devices owned	Number of students (% of e-reader owners)
Amazon Kindle	26 (46.4%)
Barnes & Noble Nook	14 (25.0%)
Sony Reader	10 (17.9%)
Other	6 (10.7%)
Total	56 (100.0%)

Table 4. E-reader use and self-identification as an early adopter

	E-reader owners	All respondents
Love or like new technologies	40 (63.5%)	698 (40.9%)
Neutral or skeptical about new technologies	23 (36.5%)	1007 (59.1%)
Total	63 (100.0%)	1705 (100.0%)

Table 5. Amount of reading done with e-books

Amount of reading	E-reader users	Other users	x2	Significance level	Significant?
About two-thirds or all	27 (42.8%)	65 (19.2%)	16.8	0.001	Yes
About a third	14 (22.2%)	90 (26.6%)	0.1	0.5	No
Less than a third	22 (34.9%)	183 (54.1%)	7.9	0.01	Yes
Total	*63 (99.9%)*	*338 (99.9%)*	—-	—-	—-

Table 6. Types of reading done with e-books

Type of Reading	E-reader users	Other users	x2	Significance level	Significant?
Recreational	54 (85.7%)	222 (65.7%)	9.9	0.01	Yes
Class	24 (38.1%)	217 (64.2%)	14.7	0.001	Yes
Work	11 (17.8%)	88 (26.0%)	2.1	0.5	No
Other	3 (4.8%)	8 (2.4%)	1.1	0.5	No

nine without said they used e-books for all their reading. Very few students without e-book readers used e-books for a large proportion of their reading; indeed, 54 percent said they used e-books for less than a third of their reading. Differences between the groups were tested for significance using a chi-squared test. Note that percentages may not add up to 100 percent, due to rounding.

Since many studies of e-book readers have found them more suitable for recreational reading than for academic work, users of e-readers were asked to identify the kinds of readings for which they used e-readers and asked to identify all options that they found applicable (table 6). Since students were allowed to choose more than one option, the totals are greater than the number of participants. Indeed, e-readers were much more likely to be used for recreational reading and other types of e-books far more likely to be used for class. For other types of reading, differences between these groups were not significant.

Since e-readers have been marketed largely for the popular fiction market and are designed to accommodate casual linear reading, it is not surprising that students who use them are most likely to report using them for leisure reading. In this area they seem to enjoy a strong advantage over more traditional e-book formats read on another device such as a computer or a cell phone. However, the study did not control for the amount of reading that students do. Students who use e-readers may be heavier leisure readers in general. Further research could clarify whether heavier use of leisure e-reading is due to the devices or the tendencies of those who own them.

A large proportion of the students who read e-books without e-readers (65.7 percent) do read e-books for pleasure. This finding is much more surprising, given the very slow adoption of e-books before the introduction of e-readers, and the ergonomic problems with reading from vertical screens.

However, students who used e-books without e-readers were much more likely to read e-books for classes. This difference may be due to the sorts of material that are available in each format. Although textbook publishers have shown interest in creating e-textbooks for use on devices such as the iPad, there is little selection available for e-readers as yet. When working without e-book readers, however, there is a wide variety of academic materials available in electronic formats, and many textbooks include an online component. Academic libraries, including the one at Queens College, subscribe to large e-book collections of academic materials. For the most part, these collections cannot be used on an e-reader, but they are available through the library's website to students with an Internet connection and a browser.

It is also possible that the e-readers are not well suited to class readings. Some past studies, cited above, have found that e-readers do not accommodate functions such as note taking, skimming, and non-sequential navigation very well. Since these are important functions for academic work, and both print books and "traditional" e-books are superior in these respects, such limitations may prevent students from using e-readers for classes.

The user behaviors reported here do not appear to herald the end of print; in fact, very few students with e-readers use them for all their reading, and over half of the students with e-readers use them for one-third of their reading or less. It is not clear whether students intentionally choose to read some materials in print and others with

Table 7. Sources of e-books

How do you get e-books?	E-reader users	Other users	x2	Significance level	Significant?
Store specific to popular e-readers	54 (85.7%)	154 (45.6%)	34.2	0.001	Yes
Open access repositories	16 (25.4%)	120 (35.5%)	2.4	0.5	No
Public library	10 (15.9%)	99 (29.3%)	4.8	0.05	Yes
Independent online retailer	9 (14.3%)	71 (21.0%)	1.5	0.5	No
Other	4 (6.3%)	39 (11.5%)	N/A	N/A	N/A
Campus library	1 (1.6%)	67 (19.8%)	N/A	N/A	N/A

their e-reader, or whether they are limited by the materials available for the e-reader. The circumstances under which students switch between electronic and print would be an excellent area for future research; is it a matter of what is practically available, or is the e-reader better suited for some texts and reading circumstances than others?

Sources of E-Books

The major producers of e-readers are either primarily booksellers, such as Amazon and Barnes & Noble, or are hardware manufacturers who also provide a store where users can purchase e-books, such as Sony (or, after the iPad launch, Apple). In both models, the manufacturers hope to sell e-books to those who have purchased their devices. They provide more streamlined ways of loading these e-books on their devices, and in some cases use DRM to prevent their e-books from being used on competing devices, as well as to inhibit piracy.

Table 7 shows the sources from which readers with and without e-readers obtain e-books. E-reader users were much more likely than non-users to get their e-books from the official store associated it—that is, the store providing the e-reader, such as Amazon, Barnes and Noble, or Sony's ReaderStore. There was no significant difference between the two groups' use of open access or independent sources, but the students who did not use e-readers were much more likely to use e-books from their public library, and while 19.8 percent of students without e-readers used the campus library as a source of e-books, only one student with an e-reader did. Since respondents were allowed to choose more than one answer, the results do not sum up to 100 percent.

By a wide margin, students who own e-readers are most likely to purchase their e-reading materials from the "official" store; 86 percent cited the official store as a source of e-books. Students without e-readers also use these stores more than any other source of e-books, but they are nevertheless far less likely to use them than e-reader users. Because it is much easier to buy e-books

from the manufacturer of the e-reader that supports them, this result is not surprising. It suggests that these booksellers have a high degree of power in the market, a potential effect of e-readers that deserves further attention. However, official e-book sellers of the sort mentioned above are not the only option for students seeking digital reading material, since both independent online bookstores and open access repositories such as Project Gutenberg were used by students.

Libraries, both public and academic, reached traditional e-book users much more successfully than e-reader users. Although many libraries have large e-book collections, there is currently little material for e-readers. Despite the existence of a service called Overdrive, which provides e-books compatible with some e-readers (excluding the Kindle), circulating e-books is challenging, due to a host of technical and legal problems. Given this environment, it is not surprising that students without e-readers were more likely to use their public library as a source of e-books than were e-reader users. The Queens College campus library, which offers many electronic collections but none that are e-reader-friendly, fared worse; only one student claimed to have used it as a source of e-reader compatible materials.

In the free comment field, students mentioned other sources of e-books such as the Apple iTunes store, the campus bookstore and lulu.com, an online bookseller that also provides self-publishing. Several also admitted, unprompted, that they download books illegally.

Attitudes toward E-readers

In the interests of learning what caused students to adopt e-readers or not, the survey used a series of Likert-style questions to ask what the students considered the benefits and drawbacks of such devices. Strikingly, e-reader owners and non-owners agreed about both the advantages and disadvantages; owning an e-reader did not seem to change most of the things that students value and dislike about it. Figure 1 shows the number of students in each group who
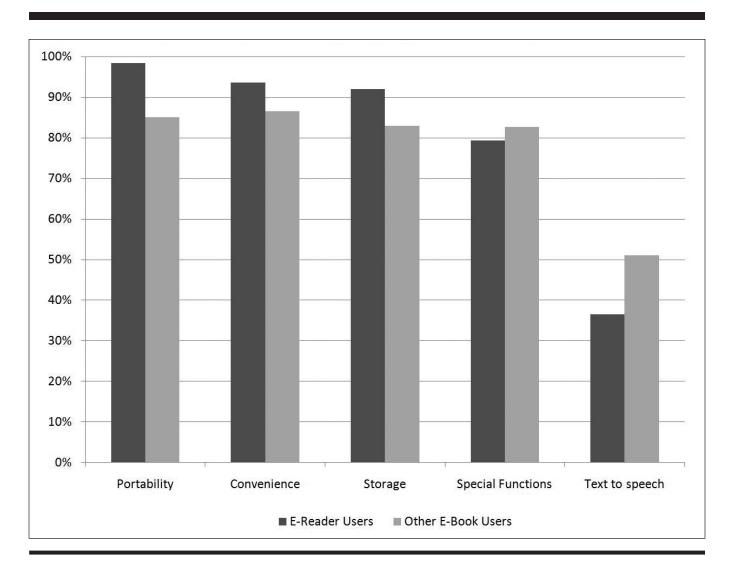
Figure 1. Features rated "valuable" or "very valuable"

rated each feature either valuable or very valuable.

If the positive features of the devices are ranked based on the percentage of respondents who considered them very valuable, the order is almost the same for students with and without e-readers. For students with e-readers, the features rank as follows: portability, convenience, storage, special functions, and text-to-speech. For those without, convenience ranks slightly higher than portability; all other features rank in the same order.

Tables 8 and 9 present the results of these questions in more detail. For the sake of brevity, the chi-squared results have been omitted. Any differences considered significant in the discussion below are significant at least at the 0.05 level.

Nearly all e-reader users and a strong majority of other e-book users rated portability, convenience, and storage either "valuable" or "very valuable," though

students with e-readers were more likely than others to rate portability and convenience as "very valuable." As the studies cited above suggest, being able to easily download books, carry them away from the computer, and store many books on a single device are very appealing to students.

Only the final two features, text-to-speech and special features such as dictionaries, attracted enough "not very valuable" or "not valuable" responses for an inter-group comparison. Both groups considered text-to-speech the least valuable feature, but students who did not own e-readers were significantly more likely to consider it a valuable or very valuable feature, perhaps indicating that the users to whom this is important have avoided the devices, which currently support it in a very limited fashion. Perhaps, too, students with e-readers rated this feature less useful because of its current limitations. In either case,

Table 8. Value of e-reader features, according to e-reader users

	Very valuable	Valuable	Somewhat valuable	Not very valuable	Not valuable at all	No response
Portability	52 (82.54%)	10 (15.87%)	1 (1.59%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Convenience	46 (73.02%)	13 (20.63%)	1 (1.59%)	1 (1.59%)	1 (1.59%)	1 (1.59%)
Storage	42 (66.67%)	16 (25.40%)	2 (3.17%)	1 (1.59%)	0 (0.00%)	2 (3.17%)
Special functions	32 (50.79%)	18 (28.57%)	7 (11.11%)	3 (4.76%)	3 (4.76%)	0 (0.00%)
Text-speech	10 (15.87%)	13 (20.63%)	12 (19.05%)	16 (25.40%)	11 (17.46%)	1 (1.59%)

Table 9. Value of e-reader features, according to other e-book users

	Very valuable	Valuable	Somewhat valuable	Not very valuable	Not valuable at all	No response
Portability	199 (58.88%)	89 (26.33%)	39 (11.53%)	4 (1.18%)	5 (1.48%)	2 (0.06%)
Convenience	194 (57.40%)	98 (28.99%)	34 (10.06%)	7 (2.07%)	2 (0.59%)	3 (0.89%)
Storage	181 (53.55%)	99 (29.28%)	40 (11.83%)	10 (2.96%)	4 (1.18%)	4 (1.18%)
Special Functions	169 (50.00%)	82 (24.26%)	58 (17.16%)	22 (6.51%)	4 (1.18%)	3 (0.89%)
Text-speech	95 (28.11%)	77 (22.78%)	77 (22.78%)	50 (14.79%)	35 (10.36%)	4 (1.18%)

it was the only variable listed in the survey for which either the "not very valuable" and "not valuable" responses from either group amounted to a combined total of greater than 10 percent of the respondents in that group.

In addition to valuing the same features, e-reader owners and non-owners had similar concerns about the device. Figure 2 shows the number of respondents in each group who agreed or completely agreed that the issues listed were one of the main shortcomings of e-book readers.

Tables 10 and 11 give the responses in more detail. The responses with which the most respondents either agreed or completely agreed were the same: Cost of e-reader, selection of e-books, and cost of e-books, in that order. Although groups such as the Electronic Frontier Foundation have raised concerns about privacy issues related to e-readers,[41] these issues have made little impression on students; both e-reader users and non-users were in agreement in putting privacy at the bottom of the list.

One exception to the general agreement between e-reader users and other e-book readers was concern about eyestrain. The majority (63 percent) of those who do not use e-readers either "completely agree" or "agree" that eyestrain is a drawback, while only 29 percent of e-reader owners did. This was a major concern for early e-readers, leading the current generation of these devices to use e-ink, a technology that resembles paper and is thought to eliminate the eyestrain problem. The disparity

among respondents suggests that that many of those who do not own an e-book reader are unfamiliar with the technology. Since e-readers are primarily sold over the Internet, many people have not had a chance to see or handle one, perhaps partly explaining this result. If they become more widespread, this may well change.

Not surprisingly, respondents who did not own e-readers were significantly more likely to prefer print. However, it is worth noting that even among students who did use e-readers, over a third "agree" or "completely agree" that they prefer print, with another third neither agreeing nor disagreeing. Use of e-readers does not appear to indicate hostility toward print. This is consistent with the students' self-reports of e-reader use; as reported above, over half of the students surveyed use e-readers for one-third of their reading or less. Thus, it seems unlikely that most of these students plan to totally abandon print any time soon; rather, e-readers are providing another format that they use in addition to print. As for students who do not use e-readers, over half say they prefer print, but this is far from their most widespread concern; rather, like e-reader owners, they are most likely to cite the cost of the reader or the selection of books available as a drawback of the devices.

Queens College students considered price the most important drawback of e-readers. For both groups (owners and non-owners), it was the factor most likely to be identified as a concern, and the difference between the
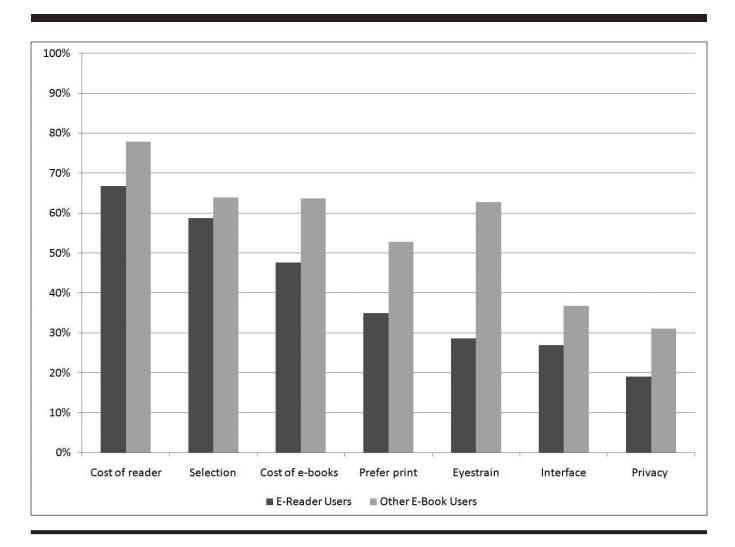
Figure 2. Drawbacks with which students "agree" or "completely agree"

two groups was not significant. At the time this survey was taken, Amazon's Kindle cost close to $300 and Barnes and Noble's Nook was priced similarly. Soon after the survey closed, however, the major e-reader manufacturers engaged in a "price war," which resulted in the prices of the best-known dedicated readers, Amazon's Kindle and Barnes and Noble's Nook, falling to under $200. Given the feeling among survey respondents that the price of the readers is a serious drawback, this reduction may cause the adoption rate to rise. It would be worthwhile to repeat this survey or a similar one in the near future to learn whether the e-reader price war has had any effect upon price-sensitive students.

In the pilot survey, students had written in further responses about the drawbacks of e-readers, but not about their benefits. While some of those responses were incorporated into the final survey, a free text field was also added to catch any further comments. Few students responded, but they brought up issues such as highlighting, battery life, and the small size of the screen. Another student was more confident in the value of e-readers and used this space to proclaim paper books dead.

E-book Circulation Programs

Finally, students were asked whether they would be interested in checking out e-readers with books loaded on them from the campus library (table 12).

As is often the case when a survey asks for interest in a prospective new service, the response was very positive. However, it was expected that many of the students would prefer to download materials for devices that they already own to take advantage of the convenience of e-readers. On the contrary, a high percentage of both types of students expressed interest in checking out e-book readers, but very few wished to check out e-books

Table 10. Drawbacks of e-readers, according to e-reader owners

	Completely agree	Agree	Neither agree nor disagree	Disagree	Completely disagree	No response
Cost of reader	19 (30.16%)	23 (36.51%)	13 (20.63%)	7 (11.11%)	0 (0.00%)	1 (1.59%)
Selection	11 (17.46%)	26 (41.27%)	12 (19.05%)	7 (11.11%)	6 (9.52%)	1 (1.59%)
Cost of e-books	10 (15.87%)	20 (31.75%)	16 (25.40%)	11 (17.46%)	5 (7.94%)	1 (1.59%)
Prefer print	6 (9.52%)	16 (25.40%)	21 (33.33%)	11 (17.46%)	8 (12.70%)	1 (1.59%)
Eyestrain	7 (11.11%)	11 (17.46%)	20 (31.75%)	15 (23.81%)	9 (14.29%)	1 (1.59%)
Interface	7 (11.11%)	10 (15.87%)	24 (38.10%)	9 (14.29%)	8 (12.70%)	5 (7.94%)
Privacy	3 (4.76%)	9 (14.29%)	13 (20.63%)	26 (41.27%)	11 (17.46%)	1 (1.59%)

Table 11. Drawbacks of e-readers, according to other e-book users

	Completely Agree	Agree	Neither agree nor disagree	Disagree	Completely disagree	No response
Cost of reader	146 (43.20%)	117 (34.62%)	50 (14.79%)	14 (4.14%)	11 (3.25%)	0 (0.00%)
Selection	80 (23.67%)	136 (40.24%)	84 (24.85%)	27 (7.99%)	7 (2.07%)	4 (1.18%)
Cost of e-books	94 (27.81%)	121 (35.80%)	76 (22.49%)	37 (10.95%)	10 (2.96%)	0 (0.00%)
Prefer print	78 (23.08%)	99 (29.29%)	116 (34.32%)	25 (7.40%)	19 (5.62%)	1 (0.30%)
Eyestrain	84 (24.85%)	129 (38.17%)	80 (23.67%)	33 (9.76%)	11 (3.25%)	1 (0.30%)
Interface	43 (12.72%)	82 (24.26%)	145 (42.90%)	33 (9.76%)	20 (5.92%)	15 (4.44%)
Privacy	39 (11.54%)	65 (19.23%)	144 (42.60%)	49 (14.50%)	40 (11.83%)	1 (0.30%)

Table 12. Interest in checking out preloaded e-readers from the library

	E-reader owners	Other e-book users
Would be interested in checking out e-readers	44 (70.0%)	257 (76.0%)
Would not be interested in checking out e-readers	4 (6.3%)	38 (11.2%)
Would not be interested in checking out e-readers, but would like to check out e-books to read on my own e-reader	15 (23.8%)	43 (12.7%)
Total	*63 (100.1%)*	*338 (99.9%)*

for a device of their own. Even students who owned e-readers were much more likely to express interest in checking out the device than checking out materials to read on it. This preference belies the common assumption that users do not wish to carry multiple devices and prefer to download everything electronically. Instead, they were interested in checking out an e-reader from the library. Unless the emphasis of the question altered the results, it is somewhat difficult to account for this response.

Future Research

Although this survey provides some data to help libraries think about the popularity of e-readers among students, many aspects of students' use of e-readers remain unexplored. Further research on how student adoption of e-book readers varies by location and demographics, particularly considering students' economic characteristics,

is certainly important. More research on the habits of students with e-readers would also help libraries and universities to better serve their needs. In particular, while this survey found that students tend to switch between electronic and print formats, little is yet known about when and why they move from one to the other.

It will also be important to research the differences between the reading habits of students who own e-readers and those who do not, as this may prove useful in interpreting the survey data about types of reading done with different kinds of e-books.

Furthermore, since the e-book market changes quickly, continuing to research student adoption of e-readers is also important to monitor student reactions to new developments.

Conclusion

While many Queens College students express an interest in e-readers, and even those who do not own one believe that their portability and convenience offer valuable advantages, only a small percentage of students, many of whom are early adopters of technology in general, actually use one. Furthermore, even those who own e-readers do not use them exclusively, and only a third say they prefer it to print. In light of these responses, the proper response to this technology may not be a discussion about whether "paper books are dead" (as one of the survey respondents wrote in the comment field) but how each format is used. Research on when, where, and for what purposes students might choose print or electronic has already begun.[42]

Many of the factors that contribute to the niche status of e-readers are changing. Competition between manufacturers has brought down the price of the reader itself, and the selection of books available for them is improving. Because these were some of the most important problems standing in the way of e-reader adoption for Queens College students, e-reader ownership could increase rapidly. The lack of a significant difference between the attitudes of e-reader owners and nonowners merits further emphasis and examination, as it may indicate that price is indeed the major barrier to e-reader ownership. Although the prices are lower now than they were when the survey was originally taken, this would present a major concern if e-readers became the expected format in which students read, perhaps even the possibility of a new kind of digital divide.

As the future is uncertain, it is important for academic libraries to pay attention to their students' adoption of e-readers, and to consider models under which they can provide materials compatible with them. However, it is important to remember that such materials would, at present, be accessible to only a small subset of users, many of whom would not object to using a print edition if one were available. Under these circumstances, and realizing that the future popularity of e-readers is far from guaranteed, developing such models is, for now, more important than putting them into practice in the short term.

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Appendix. Queens College Student Technology Survey

Queens College Student Technology Survey

CONSENT TO SERVE AS A PARTICIPANT IN A RESEARCH PROJECT

Project Title: Queens College Student Technology Survey

Principal Investigator: Michelle Fraboni, Dept. of Elementary & Early Childhood Education, 718-997-5324

This survey is part of a research project conducted through Queens College CUNY. If you decide to participate, Queens College requires that you give your signed consent.

Please read the basic explanation of the project provided below. If you decide to participate, you may sign this consent form electronically by clicking on the Agree button at the bottom of this page.

Nature and Purpose of the Project: We are interested in the kinds of technology Queens College students, like you, use in your personal and academic lives. This survey also contains questions about your experiences with technology in your classes, and your preferences when it comes to using technology as a learning tool. Your responses will help us design better learning environments for our students and develop specialized training opportunities for our faculty.

Procedures: Completing the survey will take approximately 10-20 minutes.

Potential Discomfort and Risks: There are no known risks for participating.

Potential Benefits: Future benefits to participants may include the increased availability of academic courses that offer more effective use of instructional technology.

Costs/Reimbursements:
All Queens College students who are at least 18 years old are eligible to enter in a drawing for prizes including one iPod Touch and ten $10 iTunes gift cards.
• You do not need to participate in the survey in order to enter the drawing; clicking on the disagree button will direct you to a page where you can provide your email address to enter the drawing.
• You may enter the drawing if you choose to withdraw from the survey; clicking on Exit this survey will direct you to the prize drawing page where you can provide your email address to enter the drawing.
• Multiple entries are prohibited to ensure that all entrants have an equal chance of winning
• If every Queens College student responds to the survey, there will be a 1 in 18,000 chance of winning each prize.
• The prize drawing will be conducted during finals week (5/19/2010 – 5/24/2010); prize winners will be notified by email by June 1.

Confidentiality:
Your responses will be collected anonymously: the survey does not ask you for your name or other identifying information, and we will not store your IP address. Email addresses supplied for the drawing will be collected into a separate database. All data will be stored in password-protected electronic environments accessible only by the Principal Investigator and other approved research personnel. The results of this study will be used for the purposes of academic decision-making and scholarly research. Summaries of the findings may be shared with faculty and administrators from Queens College or from other CUNY campuses, and may also be presented at professional conferences or submitted to academic journals.

Withdrawal from the Project:
Your participation is completely voluntary. You may decide to stop participating in this survey at any time by clicking on the words **Exit this survey** in the upper right corner of each survey page.

Questions about the project:
This project has been reviewed by the Queens College (CUNY) Institutional Review Board for the Protection of Human Subjects in Research and Research Related Activities and approved for the period (4/11/2010 - 3/3/2013).

If you have any questions about your rights as a research participant, or to report a research related injury, you may call:
Associate Director of Regulatory Compliance, Queens College (CUNY), (718) 997-5415.

Queens College Student Technology Survey

If you have concerns or questions about the conduct of this r

Please select your choice below.

Clicking on the "agree" button below indicates that:

• you have read the above information,

• you voluntarily agree to participate, and

• you are at least 18 years old.

If you do not wish to participate in the survey, please decline participation by clicking on the "disagree" button.

◯ Agree

◯ Disagree

End Page A

Thank you for your time! Please close your browser window and have a nice day!

End Page B

Thank you for your time. Please close your browser window and have a nice day!

Access to Technology - Hardware, Software, Internet

Exit this Survey

How old is your personal desktop computer?

◯ Less than 1 year

◯ 1-2 years

◯ 3-5 years

◯ More than 5 years

◯ Don't own

Queens College Student Technology Survey

Do you own a cell phone that is capable of accessing the Internet (whether you use that capability or not)?

○ No, and don't plan to purchase one in the next 12 months

○ No, but plan to purchase on in the next 12 months

○ Yes

○ Don't know

Which of the following devices do you own? Check all that apply.

☐ Cell phone without Internet access

☐ Cell phone with Internet access

☐ Personal digital assistant (PDA, Palm, etc.)

☐ Blackberry

☐ iPhone

☐ Other Smart phone (Google Android, Palm Pre, myTouch 3G, etc.)

☐ Electronic music/video device (iPod, mp3 player, etc.)

☐ Other electronic mobile device (please specify)

☐ Tablet PC

☐ Netbook

☐ iPod Touch

☐ Barnes & Noble ebook reader (nook)

☐ Kindle, Kindle DX

☐ Sony Reader

☐ Other dedicated e-book reader (Cybook, eSlick Reader, etc.)

Do you plan to purchase an Apple iPad?

○ Yes

○ No

○ Don't know

Do you read e-books?

○ Yes

○ No

○ Don't know what an e-book is

Yes e-books

Exit this Survey

Queens College Student Technology Survey

What device do you use to read e-books?

○ Dedicated e-book reader (Kindle, Sony, nook, etc.)

○ Other device such as cell phone, iPod Touch, laptop computer, or desktop computer

Own E-Readers

How much reading do you do on your e-book reader?

○ All of my reading

○ About two-thirds of my reading

○ About a third of my reading

○ Less than a third of my reading

What do you use your e-book reader for? (Check all that apply.)

☐ Recreational reading

☐ Class reading

☐ Work-related reading

☐ Other (please specify)

[   ]

How do you get e-books? (Check all that apply.)

☐ Store specific to the e-book reader (Amazon.com, Sony eBook Store, Barnes & Noble, etc.)

☐ Independent online retailer (BooksonBoard.com, Ereader.com, etc.)

☐ Open access repositories (Project Gutenberg, etc.)

☐ Public Library

☐ Rosenthal Library

☐ Other (please specify)

[   ]

Queens College Student Technology Survey

How valuable are the following e-book features?

	Very valuable	Valuable	Somewhat valuable	Not very valuable	Not valuable at all
Portability	○	○	○	○	○
Convenience for acquiring books	○	○	○	○	○
Ability to store many books	○	○	○	○	○
Special functions, like dictionary, Internet access, and ability to play audio files	○	○	○	○	○
Text-to-speech capabilities	○	○	○	○	○

Some of the main shortcomings of e-book readers include the following:

	Completely agree	Agree	Neither agree nor disagree	Disagree	Completely disagree
Cost of e-reader	○	○	○	○	○
Cost of e-books	○	○	○	○	○
Eye strain	○	○	○	○	○
Limited selection of e-books	○	○	○	○	○
Prefer print books	○	○	○	○	○
Privacy concerns	○	○	○	○	○
User interface	○	○	○	○	○

Other (please specify)

[   ]

Would you be interested in checking out e-book readers with books loaded on them from Rosenthal Library, if they were offered?

○ Yes

○ No

○ No, but I would be interested in checking out e-books to read on my own e-book reader

Use E-readers 1

Exit this Survey

Queens College Student Technology Survey

How much reading do you do using e-books?

◯ All of my reading

◯ About two-thirds of my reading

◯ About a third of my reading

◯ Less than a third of my reading

What do you use e-books for? (Check all that apply.)

☐ Recreational reading

☐ Class reading

☐ Work-related reading

☐ Other (please specify)

[   ]

How do you get e-books? (Check all that apply.)

☐ Store specific to popular e-book readers (Amazon.com, Sony eBook Store, Barnes & Noble, etc.)

☐ Independent online retailer (BooksonBoard.com, Ereader.com, etc.)

☐ Open access repositories (Project Gutenberg, etc.)

☐ Public Library

☐ Rosenthal Library

☐ Other (please specify)

[   ]

How valuable are the following e-book features?

	Very valuable	Valuable	Somewhat valuable	Not very valuable	Not valuable at all
Portability	◯	◯	◯	◯	◯
Convenience for acquiring books	◯	◯	◯	◯	◯
Ability to store many books	◯	◯	◯	◯	◯
Special functions, like dictionary, Internet access, and ability to play audio files	◯	◯	◯	◯	◯
Text-to-speech capabilities	◯	◯	◯	◯	◯

Queens College Student Technology Survey

Some of the main shortcomings of e-book readers include the following:

	Completely agree	Agree	Neither agree nor disagree	Disagree	Completely disagree
Cost of e-reader	○	○	○	○	○
Cost of e-books	○	○	○	○	○
Eye strain	○	○	○	○	○
Limited selection of e-books	○	○	○	○	○
Prefer print books	○	○	○	○	○
Privacy concerns	○	○	○	○	○
User interface	○	○	○	○	○

Other (please specify)

Do you plan to acquire an e-book reader?

○ Yes, within the next year

○ Yes, before I graduate

○ Yes, but not until after I graduate

○ No

○ Don't know

Would you be interested in checking out e-book readers with books loaded on them from Rosenthal Library, if they were offered?

○ Yes

○ No

○ No, but I would be interested in checking out e-books to read on my own e-book reader

Email Communication with Queens College Students, Faculty, and Administrati...

Exit this Survey