

Reading in the Office

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ABSTRACT

Reading online poses a number of technological challenges. Advances in technology such as touch screens, light-weight high-power computers, and bi-stable displays have periodically renewed interest in online reading over the last twenty years, only to see that interest decline to a small early-adopter community. The recent release of the Kindle by Amazon is another attempt to create an online reading device. Has publicity surrounding Kindle and other such devices reached critical mass to allow them to penetrate the consumer market successfully, or will we see a decline in interest over the next couple of years echoing the lifecycle of Softbook™ and Rocket eBook™ devices that preceded them? I argue that the true value of online reading lies in supporting activities beyond reading *per se*: activities such as annotation, reading and comparing multiple documents, transitions between reading, writing and retrieval, etc. Whether the current hardware will be successful in the long term may depend on its abilities to address the reading needs of knowledge workers, not just leisure readers.

Categories and Subject Descriptors

I.7.4 [Document and Text processing]: Electronic Publishing – ebooks, K.2 [Computing Milieux]: History of Computing – software, systems.

General Terms

Design, Human Factors

Keywords

EBooks, annotation, active reading, reading device.

1. INTRODUCTION

The notion of a device for reading has been around for almost as long as interactive (end-user) computing. Some of the concepts were prototyped in the late 1960s by Alan Kay, and were later embodied in several generations of devices, include the Apple Newton, the Rocket eBook, and the Amazon Kindle.

These generations of devices have been driven by innovations in device technology (e.g., displays, batteries, CPUs) rather than through evolving user needs. In this paper, I review the history

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of ebook devices, and then argue that their true utility lies in supporting active rather than leisure reading.

In the rest of the paper, I first review the history of (mostly) commercial devices designed to support various aspects of reading, and then review recent research literature with respect to requirements on devices to support active reading, the kind of reading that typically occurs in the workplace. Finally, I examine the Kindle and the iLiad with respect to their ability to support the kinds of interactions that characterize active reading.

2. HISTORY

In 1968, Alan Kay conceived the notion of a portable computer for reading that he dubbed the Dynabook. The prototype had a keyboard and a screen in a tablet-like form factor. The Dynabook was intended to help children learn. Although it was never made into a product, its design influenced the Xerox Alto computer that brought the graphical user interface into the commercial world. One of the key insights that drove the development of the ideas behind Dynabook was the notion that a book—put to educational rather than leisure use—should be interactive [13]. The goal was not to mimic the paper version but to create something with qualitatively different capabilities. I will return to this theme when discussing the role of ebooks in the workplace.

In 1993, Apple Computer released the Newton, a portable, hand-held computer that was operated with a stylus. Although primarily designed as a PDA, the Netwon was also used to read ebooks. Ebooks were stored using the Newton Book Format that supported hypertext links; the application also had table of contents and index facilities. The Newton as an ebook platform was hampered by a lack of titles: currently there are only a few hundred titles available.¹ The form factor was quite appealing, however, and attempts were made to build medical information appliances on this platform [2]. Few saw the light of day, however, as the device was discontinued in 1998 because it was not making enough money [6].

The Palm Pilot was also used as an ebook platform. It is possible to download titles from vendors such as eBookMall,² but the number of available titles is small, the books are mostly older titles out of copyright, and the size of the PalmPilot screen makes reading on these devices somewhat challenging.

Around the year 2000, there was renewed interest in reading on dedicated devices: several companies released devices and created online stores to purchase titles. Devices included Softbook Press, Rocket eBook (later Gemstar), Hiebook, Hanlin, and Franklin, among others. Software-only tools for reading on

¹ See <http://www.newtonslibrary.org/all.shtml> for a list of titles.

² <http://www.ebookmall.com/best-sellers/palm-ebooks.htm>

PCs were created by Adobe and Microsoft. A document interchange format (OEBF 1.2 Publication Structure) that allowed publishers to create content for a variety of devices was developed by the Open eBook Forum,³ and a market around these devices was created. The reading devices had larger screens than the Newton, faster CPUs, and were designed specifically for reading. They had grayscale screens with low-resolution graphics.

Gemstar bought the Rocket eBook and Softbook devices, and sold them as the REB 1100 and REB 1200. At the time they were discontinued around 2004, 50K-60K titles were available.

The latest generation of dedicated reading devices includes the Amazon Kindle, the Sony reader, and less well-known devices such as the Irex iLiad. This generation of devices differs from earlier ones in the nature of the display: the active LCD displays have been replaced with bi-stable “e-paper” technology that reduces the power consumption, thereby increasing the battery life and reducing weight. The number of titles currently available (mid-2008) for these devices varies from 20K for the Sony Reader to 60K⁴ in MobiPocket format to over 130K for Amazon’s Kindle. It is interesting to note that sellers of ebook devices are reluctant to disclose the sales numbers.

Each generation of devices was triggered by advances in hardware, whereas the value proposition remains the same: the devices allow multiple titles to be downloaded and read, and titles are often available at a discount relative to the hardcover edition price. Thus voracious readers who travel constantly can reduce the weight they have to carry in books. It is not clear, however, how significant this advantage is for the majority of readers. The downside is easier to analyze: devices are expensive and fragile, books lack portability between different devices, there is always the potential for obsolete formats to become unreadable, sharing with others is typically impossible by design, etc. Furthermore, the affordances of these devices are still not as good as those of paper, and the traveling user still has to carry (another) charger and cables.

And yet the form factor is seductive. Tangibility, relative low weight, and increasingly high-quality displays suggest that ebook devices capture some of the qualities that make reading on paper so effective. But slavish imitation of books and paper documents is neither necessary nor sufficient to make ebook devices indispensable. Instead, it is the availability of online content and the ability to bring the computer’s power to bear on various aspects of reading that will determine the long-term viability of this class of hardware.

3. READING IN THE OFFICE

The kinds of active reading that take place in the office and in academia will benefit most from the computerization of reading. While people will continue to rely on paper for some of their reading [17], some kinds of reading will benefit from the kinds of augmentation made possible by the computer

[16]. This is Alan Kay’s Dynabook vision for adults: a new medium for interacting with text.

The challenge for ebook *devices* is to differentiate themselves from laptops now commonly used for knowledge work. It is not clear whether slate hardware will ultimately be sufficiently compelling to co-exist with conventional laptops, or whether convertible designs (where the screen rotates between slate and laptop modes) will prevail. Ultimately, the hardware will not be successful without software designed to support active reading. Software alone, however, may not be enough: much of the appeal of these devices stems from their physicality.

Annotating, quoting, comparing, searching, taking notes, sharing, and quoting characterize the kinds of active reading that takes place in the workplace. The attractiveness of ebook devices for office work lies in their ability to enhance these operations. It is this sort of augmentation that is likely to make such devices indispensable, and thus secure a viable revenue stream. In this section, we describe requirements for ebook devices to support office work; some of these will also apply to the less demanding leisurely reading.

3.1 Reading

We should not take for granted that reading on a device is the same as reading on paper, as long as the same text is available. The size of the device (and thus the tradeoff with portability) affects the reading experience. For example, Marshall and Ruotolo [12] found that readers using a PDA tended to skim rather than read in depth, and that layout-sensitive text such as poetry was perceived very differently (and not for the better) on a small device with automatic text reflow that inserted line breaks into rhyming couplets. Waycott and Kuklska-Hulme report that students who used PDAs for reading noted a number of usability problems that “made it difficult to read and interact with documents on the PDA.” [18]

3.2 Annotation

Readers annotate. Annotation helps people understand what they are reading, helps them re-find important passages, acts as an aid to information triage, and generally reflects an unselfconscious engagement with the material being read [7], [19]. Freeform annotation is important because it leverages skills learned over many years of interacting with paper, but more structured text annotations can also be useful. While it may be possible to convert digital ink marks into text through handwriting recognition, the idiosyncratic appearance of ink should be preserved on the display to support episodic memory.

3.3 Quoting

People often capture quotes from books or documents they read for later re-use, sharing, or simply because the quotes are compelling. Reading devices and applications should support the management of quotes extracted from the materials that have been read. The operations should include the ability to organize, filter, and share quoted passages, the ability to link back to the original material from which the passage was extracted, and the ability to find other instances of the same passage [5].

3.4 Comparing

Analytic reading of books and other documents often creates the need to compare the document being read to other information. Paper supports these tasks by allowing different information to be

³ Now called idpf: International Digital Publishing Forum
<http://www.openebook.org>

⁴ See <http://www.teleread.org/blog/2008/03/06/mobi-titles-including-750-free-pub-domain-books-added-to-diesel-ebooks/>

viewed side-by-side; in the computer world, additional displays may be required. Thus an ebook device needs to be integrated into the network to work in conjunction with other ebooks [1] and other computing devices such as laptops and desktop PCs with large monitors.

3.5 Information seeking

Most ebook devices support some sort of search over the contents of the device, either within or between titles. But search in the office goes beyond keyword finding in the current document. Information seeking episodes may be triggered by something a person read in a book, and should take that reading context into account when retrieving additional information from repositories in the intranet or the internet. And information found during searching should be available on the reading device. Annotations can be used as launching points for queries for related work [3], and clippings (interesting or useful passages extracted documents or books) can be used as queries in a manner analogous to the Remembrance Agent [15], [14].

3.6 Note-taking and cross-linking

Reading is often accompanied by note-taking to summarize, to record and to reuse information. Readers take notes in the margins, in a variety of notebooks [11], and in other tools such as word processors. These note-taking activities should be integrated into the reading process, the system should automatically maintain links between the notes and the associated passage, and the reader should be able to sort, filter, organize, and retrieve the notes.

3.7 Sharing

While reading *per se* is often solitary, the reasons for reading often are not. Reading groups [10], review processes, analysis, and many other kinds of reading involve multiple people [9]. Annotation sharing not only transfers knowledge but can also create a sense of community around digital libraries [4]. Systems that support reading should also support information sharing: annotations, clippings, and other products and side-effects of reading can be shared to support collaboration and sense-making. This requirement has implications for the way annotations and clippings are represented, and it implies networked—rather than standalone—devices.

3.8 Mobility

One of the key affordances of paper for reading is its portability. Ebook devices approximate that to some extent, allowing reading in a variety of places where even laptop computers are not practical. We should consider, however, not just macro mobility—taking the device to a café or on a plane—but micro-mobility as well. Using a device in a colleague's office or taking advantage of a large display in a conference room are examples micro-mobility [8]. As the reader moves through the office space, the ebook should adapt to its context, taking advantage of other available computational resources. The work of Chen *et al.* [1] suggests some important steps in this direction.

4. A QUICK EVALUATION

So how well does the latest generation of devices meet the demands of active reading? In this section, I explore the

Kindle's and the iLiad's support for active reading by examining the eight activities listed in the previous section. This analysis applies to the iLiad 2nd Edition, not to the Book Edition. The latter is a less expensive version that does not have WiFi capability, making it less attractive for the office environment,

A full comparison is beyond the scope of this paper, but Table 1 compares the devices along some key dimensions described above. While the devices offer some tradeoffs (Kindle is better for reading books, whereas the iLiad is better for PDF documents), the combination of some digital ink annotation capability, a larger display capable of displaying unmodified PDF documents, and better connectivity to local (rather than bookstore) resources make it a better device for active reading. One glaring defect of the iLiad is poor support for search: it can only search file names, not the content.

The iLiad has one strategic advantage over the Kindle: it is possible to develop and deploy applications on the device, making it potentially a useful platform for exploring active reading. There is a social aspect to this openness: a community of users has sprung up to share ideas, create templates (including L_aTeX!), and to build new applications.

5. CONCLUSIONS

Electronic devices for reading books have a long history of unmet promise. While early devices focused on recreating a book-like reading experience, they failed to capture a large enough market because they offered little to the reader compared with conventional (tree-) books. Although a certain tech-savvy segment of the leisure reading population may be interested in the current crop of devices such as Amazon's Kindle, only when such devices offer functionality that is difficult or impossible to obtain on paper will they become important in the larger market of knowledge workers.

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| | | Kindle | iLiad |
|---------------------|--------------------|--|---|
| Reading | Download books | <input checked="" type="radio"/> Through Kindle store | <input type="radio"/> Through a PC from MobiPocket or other source |
| | Download documents | <input checked="" type="radio"/> Only through e-mail | <input checked="" type="radio"/> WiFi/USB/memory card |
| | Document formats | <input checked="" type="radio"/> Pre-processed, re-flowed PDF <input checked="" type="radio"/> Kindle books | <input checked="" type="radio"/> Regular PDF, image formats <input type="radio"/> MobiPocket books |
| Annotation | Types | <input type="radio"/> Text highlighting; <input checked="" type="radio"/> Limited number per book due to DRM concerns | <input checked="" type="radio"/> Digital ink |
| | Use | <input checked="" type="radio"/> Can export text; cannot manipulate | <input checked="" type="radio"/> On-device annotations shown when document is shown; cannot filter <input type="radio"/> Need PC software to create annotated document on PC |
| Quoting | | <input checked="" type="radio"/> Saved clippings (same as annotation) | <input checked="" type="radio"/> Not supported |
| Comparing | | <input checked="" type="radio"/> One page at a time | <input checked="" type="radio"/> One page at a time |
| Information Seeking | | <input type="radio"/> Searches contents, the Amazon store, Wikipedia, and the web. | <input checked="" type="radio"/> Searches for file names only |
| Note taking | | <input type="radio"/> Text only | <input checked="" type="radio"/> Text and ink; handwriting recognition; various notepad templates |
| Sharing | | <input checked="" type="radio"/> Hard to share | <input type="radio"/> Can export files to computer |
| Mobility | Physical factors | <input checked="" type="radio"/> Lightweight <input type="radio"/> Controls: next/forward buttons are too easy to press by accident | <input checked="" type="radio"/> A bit heavier to hold <input checked="" type="radio"/> Page turning control is too sensitive |
| | Context awareness | <input checked="" type="radio"/> None | <input checked="" type="radio"/> None |

Table 1. Comparison of Kindle and iLiad devices. Legend: Excellent, Good, Neutral, Poor, Bad.