E-books and E-readers for Users with Print Disabilities

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Abstract

Chapter 3 of Library Technology Reports *(vol. 48, no. 7) "Making Libraries Accessible: Adaptive Design and Assistive Technology" discusses a range of commonly available e-book formats and e-readers with an eye to their accessibility features.*

About the Author

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Introduction

In *The Rise of E-reading,* the Pew Internet Project reported, "One-fifth of American adults (21%) report that they have read an e-book in the past year, and this number increased following a gift-giving season that saw a spike in the ownership of both tablet computers and e-book reading devices such as the original Kindles and Nooks. In mid-December 2011, 17% of American adults had reported they read an e-book in the previous year; by February 2012, the share increased to 21%."[1] Dedicated devices make it easy for many readers to access the e-books they borrow or buy without having to lug heavy volumes around, while e-reader software or apps enable readers to access their books from anywhere on any device they choose.

E-books present great potential for users with print disabilities to gain access to information that might otherwise be inaccessible to them. If their devices are well designed and outfitted with the appropriate e-text formats, users with visual impairments can read e-books using the assistive technology of their choice, such as braille, screen magnifiers, screen readers, or any of the other tools described in chapter 2. The e-book publishing boom, however, has created many e-book formats and e-readers that are inaccessible to those with visual disabilities or, in some cases, hearing or learning disabilities.

The most recent "digital talking books" standards were developed by NISO in 1999,[2] but since then, there has been a lack of updated accessibility performance specifications for e-books and e-texts. The functional performance criteria in the federal Electronic and Information Technology Accessibility Standards (which implemented Section 508 of the Rehabilitation Act) and the W3C Web Content Accessibility Guidelines 2.0

(WCAG),[3] however, provide useful descriptions of what makes an e-book or e-reader device or app accessible. In his excellent chapter on e-book accessibility in *No Shelf Required 2*, Ken Petri summarizes both:

> Meeting Section 508's Functional Performance Criteria demands that a user-facing hardware or software component have at least one mode of operation and information retrieval that does not require vision; that accommodates low visual acuity; that does not require hearing and/or can amplify produced sound to compensate for poor hearing; that does not require fine motor control or simultaneous actions; and that is operable with limited reach and strength. WCAG 2.0 is organized around four broad principles:
>
> 1. Perceivable: that "information and user interface components must be presentable to users in ways they can perceive."
> 2. Operable: that "user interface components and navigation must be operable."
> 3. Understandable: that "information and the operation of user interface must be understandable."
> 4. Robust: that "content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies (W3C 2010A)."[4]

The rapid rise of e-reading makes it crucial for librarians and library staff to become familiar with the complex e-text accessibility landscape and learn to understand and recognize these features in order to support their disabled patrons with accessible collections, services, and peripherals. With the goal of facilitating accessible e-reading experiences, this chapter provides an overview of the accessibility landscape of major e-book publishing formats as well as e-reader devices, apps, and software platforms.

E-book Formats

E-books are created in *open* and *proprietary* file formats. Open e-books formats such as DAISY and EPUB are designed to be "device-independent"—in other words, to be compatible with any e-reader that supports open formats. Proprietary format e-books such as MOBI (Mobipocket), AZW (Amazon Kindle), and PDF are usually originally based on an open format, but then configured to be read by a specific e-reader and not by other e-readers largely as a competitive marketing strategy. In general, open format e-texts are far more accessible than proprietary formats.

Proprietary format e-books present several common accessibility problems. In order to facilitate the creation of device-dependent e-text files, digital rights management (DRM) is a typical proprietary strategy that can create problems for readers with print disabilities. Some e-book publishers use Adobe Digital Signature (ADS) as a DRM method, which means that users have to download the ADS application into their computer before they can read the e-book, an extra hurdle for a user relying on a screen reader. Many DRM texts are actually images of pages rather than recognizable characters, meaning that they are invisible to screen readers and other text-to-speech platforms.

Several common open and proprietary e-book formats and their accessibility properties are described below.

Open E-text Formats

DAISY

DAISY (Digital Accessible Information System) is a digital text book designed and developed for people with print disabilities.[5] It can be listened to by using a DAISY digital book player that converts text to speech.[6] Users with mobile devices can also install an application to read DAISY e-books. DAISY supports images and text with audio and allows content navigation.

> *DAISY Consortium*
> www.daisy.org

EPUB

EPUB (Electronic PUBlication) is a general-purpose format and can be used for many kinds of publications such as books, magazines, journals, and any kind of electronic document. Developed by the International Digital Publishing Forum (IDPF), EPUB uses technology similar to HTML and is intended to be device-independent. Currently, EPUB version 2 (EPUB 2) is the most widely-used format by publishers;[7] it is supported by most known devices and readers, such as Barnes & Noble Nook, Sony Reader, iPad, and Adobe Digital Edition. Amazon's Kindle e-reader does not support EPUB by default. However, you can still read EPUB books on Kindle by converting them to the format that Kindle recognizes (MOBI).

> *International Digital Publishing Forum*
> http://idpf.org

EPUB 2 still has some limitations—it does not support rich media and content interactivity in an e-book. IDPF led a working group in 2010 to define an EPUB

specification that can accommodate interactive content. The group proposed the new EPUB 3 format to accommodate such needs.[8] EPUB 3 content format is based on XHTML5 (Extensible Hypertext Markup Language) and can support other technologies such as audio and video, MathML (markup language for mathematical formulas), multiple style sheets, and pronunciation that allows for a richer user experience.

TXT

Text file (TXT) is a very simple plain-text format and is considered a universal format. It's a DRM-free format and can be read by any program.[9] TXT has limitations—it does not support formatting like bold or italics, nor does it support rich media or content interactivity. TXT documents can be read by screen readers. Because of this universal format, TXT files can also be read by many of the screen readers discussed in the next section, such as Kindle, Nook Tablet, Nook Color, Sony Reader, and Kobo.

HTML

HTML (Hypertext Markup Language, also denoted by .htm or .html) is a markup language usually used to build a website. This is a standard specified by the World Wide Web Consortium (W3C) to ensure that the format would be consistent across the website.[10] Typically, HTML files can be read using a web browser. If the files are coded properly, screen readers like JAWS, Window-Eyes, and NVDA can read the content with no problem.

> *W3C*
> http://w3c.org

Proprietary E-text Formats

Mobipocket

E-books in Mobipocket format (.mobi) files are supported by the Amazon Kindle, the Mobipocket Reader (Windows only), and a range of other devices such as BlackBerry, Symbian OS (Nokia phones), and Palm OS. Mobipocket is now owned by Amazon. Users with screen readers such as JAWS and Window-Eyes can read both Mobipocket open books and those that use DRM.

AZW

AZW is a proprietary format used by Amazon Kindle. It is developed based on the Mobipocket format with the addition of Amazon DRM unique to the Kindle e-reader. Users who purchase e-books from Kindle will have them

delivered to their Kindle e-reader or the Kindle software on their computer or mobile device, but these files are not readable external to a Kindle device or application.

PDF

PDF (Portable Document Format) was developed by the Adobe company and is one of the formats used most widely to disseminate documents. Library periodical or e-book publishers commonly use this format for full-text content. PDF allows publishers to embed various features such as fonts, rich linking, high-resolution images, and layouts for presentation.

Most electronic devices come with an application to read PDF files. However, due to the proliferation of applications that can save documents to PDF, most of those documents end up inaccessible. At minimum, an accessible PDF document has to feature well-structured "tag layers," including necessary alternative text for graphics and proper markup for headings, lists, tables, and other semantic elements. When a PDF document is created without these minimum specifications, it will not be accessible to those who use screen reader technology. For more information on how to make a PDF accessible, consult Adobe's documentation on creating accessible content.

> *Using Adobe Tools to Make Accessible Content*
> www.adobe.com/accessibility/best_practices.html

DOC, DOCX

Microsoft Word (.doc or .docx) is a proprietary document format developed by Microsoft that is used primarily as a word processor. It runs mostly on Windows operating systems and is also available for Mac operating systems. Although Word is not strictly intended to create device-read e-texts, much digital documentation has been created using this format, making it commonly used by persons with print disabilities. Screen readers such as JAWS, Window-Eyes, and NVDA can read Word documents. Kindle has also provided a Personal Document service for its users, allowing them the ability to send Word documents to their Kindle e-readers.

Table 3.1 lists supported e-text formats of the popular e-reader devices discussed in the next section.

E-reader Devices and Software

The e-book marketplace features many e-reader technologies in different platforms and styles, some more accessible to users with disabilities than others. Users can either choose a dedicated e-reader device

E-text Formats		Kindle	Kindle Touch	Kindle Fire	Nook Touch	Nook Color	Nook Tablet	Sony Reader	Blio	Google eBook	Apple iBook
	DAISY			Use specific app			Use specific app				Use specific app
	EPUB	*	*	*	*	*	*	*	*	*	*
	Mobi	*	*	*				*			
	AZW	*	*	*							
	PDF	*	*	*	*	*	*	*	*	*	*
	DOC, DOCX	*	*	*							
	TXT	*	*	*							
	HTML	*	*	*							

The leftmost header cell spans "E-reader Devices".

Table 3.1
Popular e-readers with supported e-text formats.

or install a piece of e-reader software or app on their computer, tablet, or cell phone. A dedicated e-reader is typically a tablet-like device designed specifically to read e-books. Besides the hardware (dedicated e-reader) and software (e-reader app), several Web-based e-readers are also available and can be accessed by using a web browser.

Many e-reading devices come equipped with standard features useful to readers with disabilities. For example, readers with visual impairments (or those who don't want to buy audiobooks, for that matter) can use text-to-speech on many personal e-reader devices, a feature that dictates text aloud. Good text-to-speech applications should allow users to adjust the reading speed and reading accent, show the words highlighted while they are being read aloud, and have menus and tables of contents narrated. Text-to-speech, however, has some drawbacks. Because it relies on computer dictation, sound quality is typically not as natural as a human-narrated audiobook (think "robot voice"). Current text-to-speech is also not very good at pronunciation of names and languages other than English.

Other accessibility features commonly available on e-reading devices include the ability to adjust the font size on the screen. These and other features vary considerably based on the device.

The following section lists the most common e-reader tools on the marketplace and describes their accessibility features and performance (see figure 3.1).

Kindle

Kindle, developed by Amazon, is available as two kinds of e-readers: a dedicated e-reader (Kindle device) and e-reader software (Kindle app for mobiles and computers). Earlier Kindle devices were equipped with the text-to-speech capability, but it has been noted that the device was not fully accessible because it could not read menu items aloud.[11] Newer Kindle versions

Figure 3.1
E-reader devices. Image by Brian Sawyer, www.flickr.com/photos/olivepress/6816024608, CC BY-NC-SA 2.0.

(Kindle with keyboard and Kindle Touch) have a text-to-speech feature that can read aloud the content of the home screen as well as all device menus. The latest Kindle device, the Fire, does not come with text-to-speech by default. Kindle e-readers do not support the EPUB file format and use their own proprietary e-text format (AZW) or Mobipocket. Kindle Fire also supports PDF documents.

Kindle for PC software is available with an accessibility plugin. According to Amazon's Help page, Kindle for PC "provides the following accessibility features to help you read e-books: text-to-speech (TTS) reading, voice-guided menu navigation, large font sizes, high contrast reading mode, keyboard navigation, and

accessible shortcuts. A screen reader program must be installed in order to use text-to-speech features."[12] The Kindle app for Apple products, however, still lacks accessibility features.

Kindle
https://kindle.amazon.com

Kindle for PC with Accessibility Plugin
www.amazon.com/kindle/accessibility

Nook

The Nook e-book reader also comes in two formats: a dedicated e-reader (Nook device) and software (Nook app). The Nook was developed by the Barnes & Noble company and reads EPUB format, but using a proprietary DRM schema. Neither Nook nor Nook Touch has accessibility features available. Barnes & Noble also produced the Nook Tablet, which can access the Internet like many other tablets. Users with print disabilities can install text-to-speech software on the Nook Tablet to read e-books aloud. The tablet itself, however, does not provide read-aloud capabilities by default.

Nook
http://nook.com

Kobo

Like Kindle and Nook, Kobo also provides a dedicated e-reader and software version. Both the device and the e-reader software can read EPUB, DAISY, and Mobipocket files. The Kobo device, however, does not come with a text-to-speech feature, so it's inaccessible for blind users.

Kobo
www.kobo.com

Sony Reader

Sony Reader can be considered one of the early e-readers in the market. This device, unfortunately, lacks the accessibility features that are found in several other e-readers.

Sony Reader
http://ebookstore.sony.com/reader

Figure 3.2
Blio e-reader interface.

Blio

Blio (see figure 3.2) is e-reader software developed by K-NFB, a joint venture between Kurzweil Technology (the company that created Kurzweil 1000 and Kurzweil 3000 described in chapter 2) and the National Federation of the Blind. It's designed to provide e-books that are visually appealing. The Blio platform is also accessible to screen reader technology for various computer platforms and operating systems such as Windows, Android OS, and iOS.

Blio
https://www.blio.com

iBooks

The iBooks e-reader software was developed by Apple specifically for its iOS product line, such as the iPad and iPhone. The underlying technology of this format is EPUB, but it uses Apple's specific DRM technology. Apple devices now come equipped by default with VoiceOver software that allows users to read content seamlessly. Currently, Apple devices with VoiceOver are considered to be the most accessible e-reader technology.

	Kindle	Kindle Touch	Kindle Fire	Nook Touch	Nook Color	Nook Tablet	Sony Reader
text-to-speech capable with screen readers	Yes	Yes	No	No	No	No	No
can access book text and copy it using screen reader	No	No	No	No	No	No	No
can set highlight and make notes using screen reader	No	No	No	No	No	No	No
can adjust speech rate and volume easily	Yes	Yes	No	No	No	No	No

Table 3.2
Dedicated e-reader devices and availability of basic accessibility features

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iBooks
http://itunes.apple.com/app/ibooks/id364709193?mt=8

Table 3.2 lists dedicated e-reader devices described above and notes the availability of their basic accessibility features.

Where to Find Accessible E-books

Strategies for building accessible library e-text collections are described in chapter 5, but for starters, librarians can familiarize themselves with sites and projects that make it simple to discover free EPUB, DAISY, and other accessible e-book formats for devices and e-reader software. There are also library-supported initiatives that bring accessible e-content to patrons. A few of these resources are described below.

Project Gutenberg

Books available from Project Gutenberg are often public domain works that come in different accessible formats such as EPUB, MOBI/Kindle, TXT, or HTML. Project Gutenberg provides hundreds of thousands of DRM-free e-books that can be downloaded, free of charge, to your computer, laptop, tablet, or e-reader.

Project Gutenberg
www.gutenberg.org

Google Books

Items in Google Books come in mixed accessibility formats; some of them are EPUB, while others are non-OCRd scanned PDF images. A screen reader can read Google Book EPUB formats through a web browser, but scanned image e-books are not accessible by any screen reader technology.

Google Books
books.google.com

ManyBooks

ManyBooks provides various free e-books mostly but not exclusively based on Project Gutenberg collections.[13] It offers e-books in various formats such as PDF, EPUB, Kindle, MOBI, and others by converting the files on the fly when a user requests a specific format.[14]

ManyBooks
manybooks.net

Library eBook Accessibility Program (LEAP)

The LEAP Bookshare program was developed to support people with print disabilities. This program is allowed to provide copyrighted digital books to disabled users under the Chafee Amendment.[15] Because of this copyright exception, membership in this program is available only to those with qualifying disabilities, as well as institutions and organizations that serve individuals with print disabilities.

LEAP
https://www.bookshare.org

Conclusion

This chapter has shown that while there are many e-book formats and e-readers available, people with

print disabilities currently have a limited number of reliably accessible options. A few rules of thumb in the current landscape:

- DAISY, EPUB, and TXT are the most accessible e-book formats, while accessibly designed PDFs and simple HTML documents provide generally accessible e-text formats.
- Apple handheld products outfitted with iBooks are the most accessible software-based e-reader devices.
- Software-based e-readers such as Blio and the Kindle app either are becoming equipped with text-to-speech capabilities or are relatively compatible with screen readers, but the accessibility features on dedicated devices and mobile apps must often be "enabled." This creates a scenario in which users with visual impairments, especially those who are legally blind, may have to discover and work through several additional steps to configure a device because it is not accessible out of the box.
- Table 3.2 shows the general lack of accessibility features in the most popular dedicated e-reader devices.
- There are many places to discover free accessible e-books, such as Project Gutenberg and library initiatives to support print disabled users, such as the Library eBook Accessibility Program (LEAP).

Recommended Resources

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Notes

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