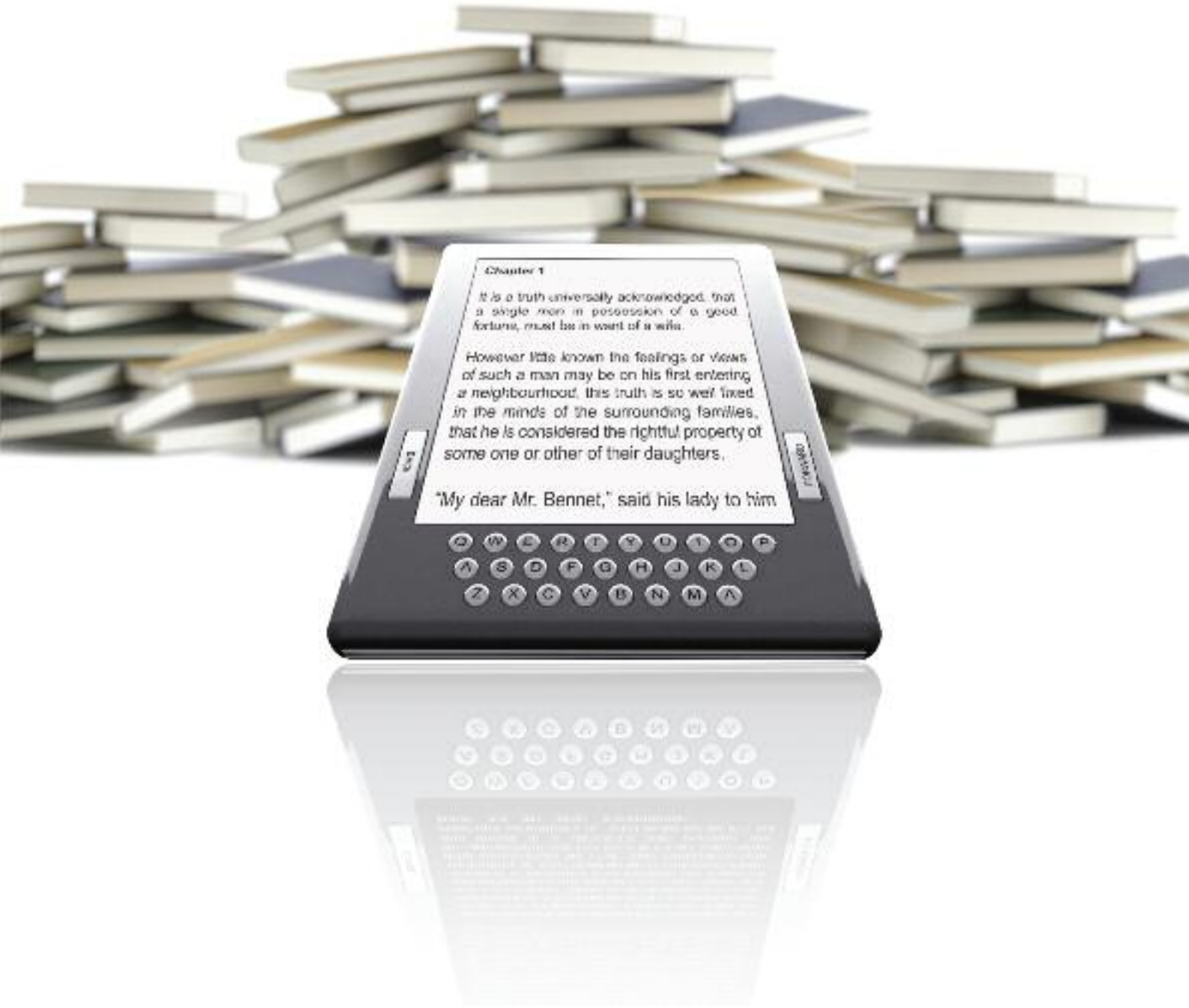
RNIB supporting blind and partially sighted people

i2 mediaresearch

Research report:

The needs of blind and partially sighted people from ebooks



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Executive summary

1. Background and introduction

This document reports primary independent research conducted by i2 media research limited (i2) commissioned by RNIB, to evaluate the needs of blind and partially sighted people in relation to ebooks.

An 'ebook' is an electronic text version of a book which can be read on an 'ebook reader'. This can be ebook reading software on a computer (desktop, portable, or tablet) or mobile phone. Examples include iBooks on the iPhone or iPad, or Adobe Digital Editions on a PC. An ebook reader can also be a dedicated hardware device designed specifically for reading ebooks. Examples include Amazon's Kindle or Sony's range of Readers.

RNIB's business objective for this small scale research was to better understand the requirements of RNIB's customer base. Specifically, RNIB wanted to better understand:

- The experience of blind and partially sighted people using ebooks now (on what devices; accessibility issues with devices and downloading; from where ebooks are accessed and for what types of materials);
- What is stopping blind and partially sighted people from using ebook readers now;
- Whether blind and partially sighted people are interested in using ebooks in the future;
- Advantages blind and partially sighted people expect from ebooks compared to other ways of reading; and
- Whether blind and partially sighted people want a dedicated ebook reader or one multi-functional gadget.

To address these research questions, a series of twelve semi-structured telephone interviews were conducted with blind and partially sighted people, of whom seven were ebook users and five were non-ebook users.

2. Main results

2.1 Ebook users

2.1.1 Range of devices used for reading books

ebook users used a variety of devices to read ebooks, including:

- Mainstream dedicated ebook reading devices, such as the Sony Reader
- Ebook reading software on mainstream multifunctional devices (with or without inbuilt or additional assistive technology) such as iBooks for iPhone and iPad, Adobe Digital Editions and Kindle for PC, and Mobipocket Reader and Olive Tree (BibleReader) for Blackberry smart phones

- Specialist assistive devices that are interoperable with open or protected ebook formats, such as the BrailleNote.
- Specialist assistive software, such as screen readers for those with no vision and screen magnification for those with residual vision, which can be used to access some unprotected ebook formats. (Users reporting solely this approach would not be considered ebook users in the context of this study.)

Many ebook users used more than one ebook reader.

Other ways in which ebook users accessed book content included: audio books in different formats such as DAISY, cassette, CD, and mp3 downloaded to an iPod. Accessibility aids were also used including: magnifiers such as CCTV and glasses, screen readers and optical character recognition software.

ebook users accessed free and paid for ebooks from a variety of sources and there was little consistency across participants in where they accessed ebooks.

2.1.2 Expectations of ebooks

Participants in the ebook user group were relatively realistic in their expectations of ebooks and ebook readers pre-purchase. They had researched the market before they invested in an ebook reader and acknowledged that these early generation ebook readers were bound to be fraught with some teething problems. Pre-purchase expectations included:

- Ability to manipulate physical properties of text
  - Size
  - Font
- Flexibe reading format:
  - text size manipulation
  - text to speech
- Reduced eyestrain
  - large text
  - low glare
- Multi-functional lightweight device
- Availability of book titles

There was almost unanimous agreement in the ebook user sample that a multi-functional (non-dedicated) ebook reader would be their preference as it offered better value for money and was more practical. For instance, it could enable them to carry just one rather than many devices.

Many participants in the ebook user group were excited about the accessibility of the iPad but were waiting until the next version which they hoped would have ironed out any initial accessibility and usability issues.

2.1.3 Positive experiences of ebooks

A number of positive experiences of reading ebooks were enjoyed by participants in the ebook user group, including:

- access to a wider range of content than is currently accessible using other reading methods, particularly for academic or study purposes;
- generally easy to read ebooks
- generally easy to search for and download ebooks;
- some good accessibility features identified across the range of ebook readers
- easy to navigate in comparison to narrated audiobooks;
- ability to annotate (where this function is available), which was useful regardless of whether the user accessed their ebook through magnification or text to speech:
  - annotation was of particular benefit for people reading ebooks in work and education contexts; and
- improved social inclusion:
  - increased potential to share their reading experiences with others, such as book clubs; although in practice, for leisure reading, some ebook users still preferred audiobooks.

2.1.4 Negative experience of ebooks

Experiences of reading ebooks were not all positive.

- Incompatibility of ebook readers with some ebook file formats was frustrating to users and did not meet expectations:
  - limited access to a range of file formats with any one dedicated device;
  - academic or work related book content was often available in PDF format and PDF files were often problematic to access using ebook readers;
  - ebook users were generally optimistic that these compatibility problems would improve with time, particularly given that ebooks are now in the commercial mainstream.
- The cost of ebooks was disappointing to some ebook users, particularly after having purchased an expensive ebook reader.
- Accessibility issues were dominated by feedback about restricted functionality for text manipulation and ability to personalise/customise their preferences, such as:
  - text size,
  - font style,
  - colour contrast,
  - column formatting,

- character spacing,
- interaction method (eg, click or flick pages),
- screen size and characteristics (eg, the trade off with portability, glare, flicker).

2.2 Non-ebook users

2.2.1 Range of devices used for reading books

Non-ebook users reported using a variety of methods for reading such as braille, audiobooks in different formats including cassette, CD, DAISY and mp3 downloaded onto an iPod. Accessibiltiy aids were also used including: CCTV, screen magnification software and screen readers.

Most non-ebook users indicated a preference for audiobooks. They reported appreciating reading methods that were convenient, easy to use and relatively low-tech. However, some participants reported that they have scanned hard copies of books into their computer for reading with a screen reader, suggesting that they are relatively comfortable using digital formats they are familiar with.

2.2.2 Expectations of ebooks

Compared to the ebook users, non-ebook users were less informed about ebooks and ebook readers and were less specific about their expectations. Their main expectations of ebook readers compared to familiar reading devices and methods related to:

- improved portability; and
- access to a wider range of book titles at lower cost.

Accessibility was an important feature for non-ebook users if they were looking to buy an ebook reader. However, they were less able than the ebook user group to specify what characteristics would make the ebook reader more accessible.

2.2.3 Barriers to adopting ebooks

Whilst the non-ebook user group acknowledged that they had not researched the ebook market in any depth, the main barriers to adopting ebooks centred on:

- perceived poor accessibility of ebook readers;
- perceived as too technical and difficult to use;
- high cost, particularly for purchasing a device with good accessibility features; and
- low interest, because other reading methods they used met their needs.

3. Summary of differences between the groups

In contrast to the ebook users, non-ebook users:

- reported having less residual vision;
- were more likely to express concern about lack of audio output for menus and book content;
- tended to be less knowledgeable about ebooks, defining them in terms of portability and convenience;
- were less confident about new technology in general and tended to report more difficulty using devices like PCs;
- indicated less proactive behaviour to increase their understanding of ebooks and the benefits that they might derive from them. More information about technology was gauged from broadcast/national media than from direct, first-hand questioning (such as from retailers).

4. Key features that blind and partially sighted people would like from ebook readers

Themes that emerged from both groups as key requirements from ebook readers for blind and partially sighted people included:

- better accessibility features for book content and menus to improve comfort and reduce eyestrain when reading for those with some vision
  - control over properties of the font and screen
  - text to speech output
- screen size maximised, capitalising on the size of the device
- screen requirements for participants with residual vision included:
  - low glare
  - high clarity and resolution
  - ability to change brightness and contrast
  - no screen flicker
- access to a wide range of book titles at a low cost
  - compatibility with a range of file formats
- portability
  - ebook content management
  - navigation
  - annotation

- good usability
- aesthetically desirable
- good product support.

5. Conclusions

The research results suggest the following conclusions:

- What constitutes an 'ebook' and 'ebook reader' is complex: there is a wide range of open and protected ebook file formats available, which are compatible with various ebook readers (hardware and software) and both commercial and specialist devices.
- Incompatibility of different ebook file formats is problematic: participants were optimistic that current problems in this regard would resolve with time.
- It is perceived that ebooks will eventually enable blind and partially sighted readers to access the same range of books titles as their sighted peers, supporting social inclusion.
- ebooks are perceived as more particularly useful for work and study: many participants reported a preference for audiobooks for leisure reading, as it was more relaxing and required less effort. In contrast, the functional benefits of ebooks, such as navigation, were perceived as more useful in work and study contexts.
- ebook readers varied in meeting users' different accessibility needs: the significance of accessibility issues that were identified by participants varied from one ebook reader to another, and one ebook user to another, depending on their accessibility needs. Several participants used assistive technologies to support their access to ebooks. This suggests either that ebook readers are not currently sufficiently accessible, or that blind and partially sighted ebook users tend to use assistive technology tools with which they are familiar to access as broad a range of content as possible.
- Compatibility of DRM-protected ebooks with assistive technologies would support improved access to ebooks for blind and partially sighted people.
- Preferences for dedicated ebook readers or ebook readers on multifunctional devices varied: overall, amongst the ebook user group, ebook readers on multifunctional devices were preferred to dedicated ebook readers. For the non-ebook user group, preference was divided more equally. Whilst multifunctionality was considered useful by some, for others, it implied increased complexity.
- Blind and partially sighted non-ebook users perceived ebook readers to be inaccessible.
- Clear communications on the benefits of ebooks for blind and partially sighted people would be helpful.

Contents

1. Introduction

1.1 Background

This document reports primary independent research conducted by i2 media research limited (i2) commissioned by Royal National Institute of Blind People (RNIB), to understand the current needs and activities of blind and partially sighted people in relation to ebooks. RNIB's business objective for this research was to better understand the requirements of RNIB's customer base.

1.2 Alternative access to books

Blind and partially sighted people can access books using a number of alternative formats such as unabridged audiobooks, braille, large print and electronic text.

The main benefits offered by electronic text are that it is flexible. The font type, size, colour and background colour can all be personalised, and it can be output as synthetic speech or refreshable braille (see below). Also, if structured correctly, it can be navigable, which is a particular benefit for books that are not meant to be read in a linear fashion. Formats such as Digital Accessible Information System (DAISY) – see below) allow print impaired readers to scan through the text and search for specific sections, just as a sighted person would.

The following are some of the formats and tools used by blind and partially sighted people to access electronic text, depending on whether they prefer or need to access text visually or audibly.

DAISY

The DAISY format provides the user with flexible access to digital material via enhanced navigation. So, the same way a sighted reader may skip through the front matter of a book, find chapter headings, find a specific page, jump to certain parts of the text or read from cover to cover – this is all possible with DAISY. The user can also decide how they wish to access the material. For example, they may only want to listen to the audio; if they are partially sighted they may want to read the text visually and/or listen to the audio and see the synchronised text on screen as well.

Text to speech

Text to speech software uses computer-generated synthetic speech to read out each word of an electronic file. No recording is made and there is no audio copy of the text created. Many readers benefit from this software, including people with low vision, who struggle to see the text, and people with dyslexia, who benefit from hearing the words read out to them while they read the text.

Screen reader

A screen reader is a software program that allows users to access the contents of a computer screen and navigate around its structure using synthetic speech. It is more advanced than text to speech, as it not only reads out digital text, it also provides navigational and structural information, allowing a reader who has little or no vision to navigate through the different sections of a document, website or computer program.

Screen magnification

Screen magnification software can magnify the text, menus and icons on a computer screen up to 32 times, to allow users with low vision to access on-screen information visually. Many software packages also allow customisation of text and background colours to improve readability and contrast.

Electronic braille display

An electronic braille display is a tactile device that works in conjunction with a screen reader to display the contents of the computer screen as braille. A braille display can be made of varying amounts of braille 'cells', which include metal or nylon pins that move up and down electronically to reflect the text on screen.

Optical Character Recognition (OCR) software

If a book is not available in an accessible format readers often need to buy the print book and then use OCR software, in conjunction with a PC and scanner, to copy printed text to the computer so it can be read by a screen reader or magnified with software.

1.3 Ebooks

ebooks are now becoming popular in the commercial mainstream (Moore, 2009) with the advent of new dedicated ebook reading devices like Amazon's 'Kindle' and the Sony range of 'Readers', as well as multifunctional devices such as Apple's iPad. Given the inherent flexibility of electronic text (see section 1.2, above), ebooks have huge potential to increase access to books for blind and partially sighted people via the mainstream.

ebook file formats

There are numerous ebook file formats available. The two most popular are ePub and PDF (the latter is widely known through its use as an electronic document format). In addition, most new ebooks are 'protected'. This means they have Digital Rights Management (DRM) applied, which places restrictions on what you can do with your ebook. For

example, if you buy an ebook from Amazon, it will be in the 'AZW' format, which is Amazon's proprietary format. This has DRM applied which means you can only read your ebook using Amazon products, such as the Kindle. Similarly, if you buy an ebook from Waterstone's it will be in the ePub format and will have DRM applied from Adobe. While unprotected ePub can be read on most devices, if it is protected with Adobe DRM it is not so versatile, and can only be read on devices that support Adobe ePub.

Ebook readers

There are two types of ebook reader: dedicated ebook reading devices (hardware) and ebook reading software. These types are outlined below.

Dedicated ebook reading devices (hardware)

A dedicated ebook reading device is designed specifically for the purpose of reading ebooks. It is portable (with long battery life) and usually has an 'e-ink' screen, which is non-glare and readable even in bright sunlight. Commercially available examples include the Sony range of Readers and the Amazon Kindle.

ebook reading software

Alternatively, ebooks can be read using ebook reading software on a multifunctional device such as a smart phone or computer (PC/Mac/laptop/tablet). There are numerous examples of ebook reading software, including: Adobe Digital Editions (for PC and Mac), Stanza (for PC, Mac and Apple devices such as iPad and iPhone), iBooks (Apple ebook reading app available on iPhone, iPad, iPod Touch), and Amazon Kindle software (for PC, Mac, Apple devices such as iPad, iPod Touch and iPhone, and smart phones with the Android operating system).

1.4 Accessibility of mainstream devices

The functionality and accessibility of ebook readers varies, so different ebook readers will meet different needs.

Magnification

Those who require an increased text size have two main options: enlarged text or magnification. Many dedicated ebook reading devices allow you to enlarge the ebook content up to point size 30 approximately, and the text will reflow to fit the screen. Similarly, ebook reading software programs allow varying levels of flexibility in terms of how the text is displayed: for example, to change the typeface, font size, text and background colours to suit your needs.

Alternatively, screen magnification software may be used. Some devices come with built-in screen magnifiers: for example, every iPad, iPod Touch and iPhone has a 'Zoom' function, which Apple's website explains "lets you magnify the entire screen of any

application, zoom up to five times the normal size and move left, right, up, and down to view any portion of the screen close up". This can be used in conjunction with Apple's iBooks app to read ebooks. Alternatively, screen magnification software packages can be installed onto your computer or smart phone separately.

Audio

Someone who requires audio output will rely on either built-in or additional screen reader or text to speech technology. The Amazon Kindle device offers the most functionality of the dedicated ebook reading devices currently available, as it provides text to speech for ebook content and some audible menus. iBooks is the only ebook reading app for protected ebook content that works with 'VoiceOver', the screen reader that is built into every iPad, iPod Touch and iPhone. VoiceOver allows the reader to navigate throughout an ebook (which is not possible using text to speech on the Amazon Kindle device).

Those who prefer to use their own screen reading software on their PC or Mac are restricted to certain ebook reading programs such as Stanza, which only supports unprotected ebook content. Adobe Digital Editions, the industry standard ebook reading software for protected ebooks, does not currently support screen readers.

1.5 Research objective and research questions

To meet the broad objective to understand the current needs and activities of blind and partially sighted people in relation to ebooks, a series of research questions were posed.

Ebook users

Research questions for ebook users were:

- What advantages do blind and partially sighted people expect from ebooks as compared to other ways of reading?
- How do blind and partially sighted people find using ebooks now?
  - on what devices?
  - what do they find accessible or inaccessible about the devices?
  - what do they find accessible or inaccessible about downloading of ebooks?
  - where do they get ebooks?
  - for what materials?
- Do blind and partially sighted people want a dedicated ebook reader or one gadget that does everything for them?

Non-ebook users

Research questions for non-ebook users were:

- What advantages and disadvantages do blind and partially sighted people expect from/ perceive in relation to ebooks as compared to other ways of reading?
- What is stopping blind and partially sighted people from using ebook readers now?
- What do blind and partially sighted people want from ebook readers?
- Do blind and partially sighted people want a dedicated ebook reader or one gadget that does everything for them?

2 Method

2.1 Approach

To evaluate blind and partially sighted people's needs from ebooks, semi-structured telephone interviews were conducted with both ebook users and non-ebook users. This method allowed a flexible approach to questioning enabling the interviewer to clarify ambiguous participant responses. By including non-ebook users, barriers to adoption and use could also be explored. A discussion guide was generated to define the scope of the questioning, and was refined following feedback from RNIB (see Appendix 1).

2.2 Discussion Guide

The questioning was structured with open, broad questions asked initially, followed by more specific prompted questioning. Participants were filtered through to different sections in the discussion guide depending on whether they were classified as ebook users or non-ebook users:

[Both samples]

- Warm up: General reading experiences (eg, Why read? Importance? Formats? Assistive aids? Contexts)
- Advantages and disadvantages of the different methods used
- Awareness and understanding of ebooks (code grouping: user/non-user)

[Ebook users]

- General experience of ebooks (eg, why they started using them; what for; whether they met their expectations)
- Perceptions and experience with specific ebook readers used
- Perceptions of other ebook readers that are not used

[Non-ebook users]

- Perceptions and expectations (and any trial experiences) of ebooks in general
- Perceptions and expectations of specific ebook platforms
- Barriers and potential drivers to access and use

[Both samples]

- Perceptions of how reading could be better supported through technology; wish list of features/functions
- Preference for dedicated ebook reader compared with a generic device that offers other functionality

2.3 Sample

Twelve participants (6 female, 6 male) took part in telephone interviews. Seven were ebook users, and five were non-ebook users. The age of the sample as a whole ranged from 22-62 years (mean age = 47.4 years). All participants were recruited via RNIB: RNIB passed on details of members of the public who had contacted them about ebooks.

Demographics of the two samples (users and non-users)

The ebook user group were on average slightly younger (range: 22-52 years; mean: 43.1 years) than the non-ebook user group (range: 42-62 years; mean: 53.4 years). In the ebook user group there were 3 females and 4 males, and in the non-ebook user group, there were 3 females and 2 males.

Vision-related characteristics

Participants' level of sight was categorised between 0 and 6. This categorisation was as used in the Network 1000 research report (Douglas, Corcoran & Pavey, August 2006) (see below).

[0] No light perception

[1] In a room during daytime, I can tell by the light where the windows are

[2] I can see the shapes of the furniture in a room

[3] I can see well enough to recognise a friend if I get close to his or her face

[4] I can see well enough to recognise a friend who is at arm's length away

[5] I can see well enough to recognise a friend across the room

[6] I can see well enough to recognise a friend across the road

Participants were asked to self-report how much, if any, vision they had using the statements listed above.

The ebook user group had a broader range of self-reported level of sight (ranged from [0] to [5]) compared to the non-ebook user group (ranged from [1] to [3]). Table 1 indicates the two samples' full range of scores on this sight index.

Participants were asked the age of onset of their sight loss. Across the sample as a whole, around half reported the onset from birth, and half reported having acquired sight loss during adulthood.

For the ebook user group, three reported sight loss problems from birth, and two reported later onset (at 16 and 24 years). Two others gave mixed responses: one reported problems in their left eye from birth, and later problems at age 21 with nystagmus. The other reported some visual impairment from birth but that the sight loss only really impacted on their life since age 30.

For the non-ebook user group, two reported onset of sight loss from birth (one of which was diagnosed at age 19 years, and the other had reading vision up to the age of 15), and three reported later onset (at 42, 32 and 20 years).

Table 1. Pattern of self-reported sight across the two samples

	ebook users	Non-ebook users
[0] No light perception	A2, A7	
[1] In a room during daytime, I can tell by the light where the windows are		B5
[2] I can see the shapes of the furniture in a room		B1, B2
[3] I can see well enough to recognise a friend if I get close to his or her face	A5	B3, B4
[4] I can see well enough to recognise a friend who is at arm's length away		
[5] I can see well enough to recognise a friend across the room	A1, A4, A6	
[6] I can see well enough to recognise a friend across the road		
Totals	**7**	**5**

2.4 Procedure

Each participant was contacted by telephone to arrange an interview. Participants gave informed consent to take part in the study which they were told was about their experiences of reading and in particular ebooks.

Background information (demographics and sight loss characteristics) was collected from all participants before moving on to the main discussion. The interviews lasted between 15 and 50 minutes, with most lasting around 30 minutes.

At the end, participants were thanked for taking part; asked if they were happy to be re-contacted by RNIB at some point in the future (to which all agreed), and debriefed about the study. There was no payment or gift incentive to take part.

3 Research results for ebook users

3.1 Summary of reading devices and preferences

The market for ebook readers is complex, and this was drawn out in our analysis of the interviews. Participants in the ebook user group used a wide range of what can broadly be described as ebook readers:

- Mainstream dedicated ebook reading devices;
- Ebook reading software on mainstream multifunctional devices (with or without inbuilt or additional assistive technologies);
- Specialist assistive devices that are interoperable with open or protected ebook formats;
- Specialist assistive software, such as screen readers, which can be used to access some unprotected ebook formats (see section 3.6). Users reporting solely this approach would not be considered ebook users in the context of this study.

Many participants in this sample described themselves as technically minded or interested in technology. Many used multiple ebook readers. Six of the seven people in the ebook user sample classified themselves as ebook users; one, who used ebook reading software on a smart phone, did not.

Below, background context is provided for each participant in the ebook user group. Information is provided on the perceived importance of reading and the types of material they read; the ebook readers and other reading methods or devices they use; their reading method preferences; how they originally found out about ebooks and what motivated them to invest in an ebook reader.

Participant A1, male, 18-24 years; onset at 16 years, level of sight [5]	
Importance of reading and types of content	**"Very important"**: reads for leisure and academic purposes
ebook readers used	Sony Reader Touch edition, Adobe Reader (Acrobat Professional)
Other methods/ devices/aids used	Magnifying glass, CCTV (occasionally), built-in screen magnifier and screen reader with Mac
Reported preferences/why	Sony Reader Touch edition: no eyestrain
How participant found out about ebooks	ebook readers were on display in the British Library; had previously heard about the Kindle but cannot recall source
Pre-purchase expectations	Reduce eyestrain because of large text and low glare

Participant A2, female, 45-54 years; onset from birth, level of sight [0]	
Importance of reading and types of content	**"Most important thing"**: reads for leisure, news and information
ebook readers used	Microsoft Reader for BrailleNote: an assistive PDA technology, Bookworm Braille eReader
Other methods/ devices/aids used	Victor Reader Stream, screen reader (Kurzweil) for laptop
Reported preferences/why	(Not specified)
How participant found out about ebooks	Word of mouth and demonstration (BrailleNote); Project Guttenburg
Pre-purchase expectations	None: **"Until you've actually tried them you don't know how useful they're going to be"**

Participant A3, male, 35-44 years; onset at 24 years, level of sight [4]	
Importance of reading and types of content	**"Hugely [important]"**: reads for research to support his work as a storyteller and voice teacher
ebook readers used	Mobipocket ebook reader for Blackberry
Other methods/ devices/aids used	Audiobooks (though not recently); screen magnifier (Blackberry), optical character recognition software (Abbyy FineReader)
Reported preferences/why	ebook [reason not specified]
How participant found out about ebooks	Phone retail outlet: **"...[I] said I need a phone where I'll be able to see stuff, and maybe read books, as well as make calls and check my diary."**
Pre-purchase expectations	Reduce eyestrain

Participant A4, male, 35-44 years; onset from birth, level of sight [5]	
Importance of reading and types of content	**"It's essential"**: reads for work as Catholic priest, academic purposes, leisure, news and information
ebook readers used	iBooks for iPad
Other methods/ devices/aids used	Built-in screen reader on Mac; audiobooks (uses text to speech to convert PDFs to audio for use on the iPod)
Reported preferences/why	Variable: **"It depends on the circumstances [...] depending on how tired my eyes are..."**
How participant found out about ebooks	Bookshops, general information online
Pre-purchase expectations	Multi-functional lightweight device; ability to manipulate physical properties of text (size/font)

Participant A5, male, 44-54 years; onset from birth, level of sight [3]	
Importance of reading and types of content	**"It's incredibly important"**: reads for leisure and academic purposes
ebook readers used	Olive Tree Bible software for Blackberry (see: www.olivetree.com)
Other methods/ devices/aids used	Victor Reader Stream; other, unspecified model of DAISY player (for home); PC screen magnifier and screen reader (ZoomText); CCTV; screen magnifier (Blackberry),
Reported preferences/why	Variable: DAISY is most comfortable but not available for some book and other text files
How participant found out about ebooks	Waterstones; RNIB publications stand at Sight Village exhibition; word of mouth and surfing the net (for Bible software on Blackberry Storm)
Pre-purchase expectations	Flexibility in reading; choice of text size manipulation or text to speech

Participant A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5]	
Importance of reading and types of content	**"Very [important]"**: reads for leisure, practical (eg, utilities) and academic purposes
ebook readers used	Sony Reader; Adobe Digital Editions; Kindle for PC
Other methods/ devices/aids used	Victor Reader Stream; other unspecified model of DAISY player (for home)
Reported preferences/why	In general, audiobooks for leisure reading; electronic reading methods for academic purposes.
How participant found out about ebooks	Waterstones (for general ebooks), RNIB website (for Adobe Digital Editions), Amazon website (for Kindle)
Pre-purchase expectations	Ability to access text independently and portability

Participant A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0]	
Importance of reading and types of content	**"[Reading] is absolutely vital"**: reads for leisure and information purposes
ebook readers used	iBooks for iPhone
Other methods/ devices/aids used	Built-in screen reader on Mac, audiobooks on cassette, CD and iPod
Reported preferences/why	Accesses ebooks mostly through TTS on Mac "I don't seriously intend to use iBooks until I get an iPad"
How participant found out about ebooks	One of the technical magazines via Twitter, BBC Radio 4's In Touch (Kindle)
Pre-purchase expectations	Availability of book titles

3.2 Pre-purchase expectations of ebooks

Participants in the ebook user group were relatively realistic in their expectations of ebooks and ebook readers pre-purchase. They had researched the market before they invested in an ebook reader and acknowledged that these early generation ebook readers were bound to be fraught with some teething problems. Pre-purchase expectations included:

- Ability to manipulate physical properties of text
  - Size
  - Font
- Flexible reading format:
  - text size manipulation
  - text to speech
- Reduced eyestrain
  - large text
  - low glare
- Multi-functional lightweight device
- Availability of book titles

3.3 Individual differences in ebook reading

For participants with no light perception, an ebook reader would need to be capable of offering text to speech output. For several ebook users, accessibility aids such as text to speech software were used to support access to various electronic text files of books which many participants called 'ebooks', irrespective of the file format used. Some participants were unsure about whether or not they were using ebook reading software; they simply knew they could access electronic text files of books.

Participants in the ebook user group were resourceful in their methods to access book content. Electronic text files were perceived by participants as more flexible and better enabled them to access book content according to their personal and context-dependent needs.

Some participants' needs varied throughout the day, for instance, the size of the text they needed to access ebook content. Others required different reading methods for different contexts. For instance, participant A4 used text to speech to convert PDF files into synthetic audio so that they could be used as audiobooks on his iPod for use when out and about.

> **"[Why is digitising content helpful to you?] It's just the accessibility and the availability, like you just go and buy a book in the store if that was available online and then I can manipulate it to the format that best suits me, either large print, or ebook on the iPad, or convert it to audio depending on the circumstances."**
> **(A4, male, 35-44 years; onset from birth, level of sight [5])**

3.4 Accessibility of dedicated ebook readers

Overall, some participants found that their choice of commercial mainstream dedicated ebook reader was determined by which was the best of a 'bad bunch'. None of the ebook readers that participants were aware of completely met their needs with regard to accessibility.

> **"I've got quite a lot of functional vision, my main problem is eyestrain, so I'd imagine for someone who was completely blind... well, I don't know if they'd be using an e[book]reader, if they were it would be very difficult for them to navigate the software."**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

> **"None of the ebook readers are of any use because they're mostly large print. […]. I don't think there's anything that would make me reconsider [getting a commercial dedicated ebook reader]."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

Sony Reader

Feedback on the Sony Reader was provided by two users and several non-users of the Sony Reader, based on their own research of this product.

Positive experiences

Positive accessibility features of the Sony Reader (Touch edition) were noted by participants including:

- ability to access a wide range of file formats including PDF and DOC (Microsoft Word);
- the ability to enlarge text with five magnification options;

- reduced eyestrain; and
- the general aesthetic.

One participant, A1, reported that he had compared ebook readers in a shop and considered the Sony Reader to have the largest font size and range of sizes. The dedicated button to control font size was considered easy to use.

> **"The pros of the Sony Reader are that I can get lots of text electronically and enlarge it very easily, without getting the eyestrain that I would get from a screen, a standard screen. [...] The ability to enlarge text, you can just simply click and "make larger" or select a category, "large", "extra large", "extra extra large", which is incredibly helpful. [...] the flexibility to change the text as the day progresses is very useful.[...] it doesn't really stand out if you're sitting in the train reading a large print book, you don't have to field questions about why you're carrying a magnifying glass, which can be quite annoying in a lecture setting"**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

Another Sony Reader user, participant A6, considered that it gave cheaper and easier access to book content that would otherwise require reformatting.

Negative experiences

Several accessibility problems with the Sony Reader were reported by participants, including:

- inflexibility in changing font style (text is presented only in Times New Roman) making it difficult to read for long periods;
- words too close together;
- inflexibility in inverting colours (grey/black);
- screen brightness too dull and difficult to use in low light conditions;
- screen size could be larger;
- momentary 'flickering' with each page turn;
- awkwardness of frequent clicking to 'turn the pages' of ebooks;
- column widths do not adjust to size of the screen when text enlarged; and
- occasional 'crashing'.

"The cons are that I can't invert colours, which is quite frustrating because [...] every time you change page it inverts for about a split second; the technology is there but they just haven't set it up so that it can be permanently inverted. [...] I don't find it [Sony Reader] especially accessible really, it's kind of the best of the bad lot that I found."
(A1, male, 18-24 years; onset at 16 years, level of sight [5])

"[with the Sony Reader] you can't change the style of the font, so everything is in Times New Roman, [...] I find the flick as you change the page quite tricky, and for me it doesn't work so well because by the time you've got the size you want there's so few words on the page so you're doing lots of clicks, and you can't change the colour of the background and you can't change the contrast and the brightness, and I find it too dull really [...] it's not got enough functionality for it to be that pleasurable."
(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])

Participants A1 and A3 reported that a bigger screen (with even larger magnification) and access to colour would be desirable additions to the Sony Reader.

"A larger tablet would be more useful, I guess, and there's more diversity in printed media in that you can have it in all shapes and sizes. It would be good to have – I mean a huge e[book] reader would be annoying because you'd have to lug it everywhere but slightly larger than now would be quite doable, maybe a 10-inch model."
(A1, male, 18-24 years; onset at 16 years, level of sight [5])

This participant also considered that compared with other ebook readers, the Sony Reader had slightly more glare which he believed was because it was a touchscreen.

"...all in all I'd rather have less glare and no touchscreen than touchscreen and glare..."
(A1, male, 18-24 years; onset at 16 years, level of sight [5])

One Sony Reader user had hoped that these problems with this ebook reader were just teething problems, but they were disappointed.

> **"It was a solution to a problem for my course really. I didn't at the time know of any others so I hadn't seen any alternatives or even know they were available quite at that point. And I thought, as well, maybe if I stuck at it and like with many things you get used to it, that I might find that it was a solution but that didn't prove to be the case."**
> **(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])**

Amazon Kindle

Several participants in the ebook user group commented on the Amazon Kindle, either based on their direct experience with it, for instance, through a demonstration or from research they conducted when they were looking to buy an ebook reader. None of the ebook user sample had invested in a dedicated Amazon Kindle ebook reader.

Perceived positive features of the Kindle that were noted included:

- low cost; and
- voice output for the menus (latest version).

Perceived negative features noted by participants included:

- access to a limited range of file formats,
- not all PDF files are supported;
- less access to free books; and
- larger overall size of product with relatively small screen, compared with other dedicated ebook readers.

> **"…if you get the Kindle, it's one that I think is a bit limited in the file formats it can cope with. You get one set of books that is not compatible with all machines. That's one potential problem I can see."**
> **(A5, male, 44-54 years; onset from birth, level of sight [3])**

Bookeen

Whilst no-one in the ebook user sample was using the Bookeen ebook reader, one participant commented positively on its ability to increase font size.

> **"the Bookeen is the only one that seems to go large enough for my sight purposes, not their recent one, the last one, the Bookeen Cybook Pro, that goes up to over 20 point font. The recent one doesn't."**
> **(A3, male, 35-44 years; onset at 24 years, level of sight [4])**

However, the Bookeen, as with other ebook readers, was criticised for screen flicker when turning pages. It was not clear whether this opinion was based on a demonstration or from what they had heard about this ebook reader.

3.5 Accessibility of ebook software on mainstream multifunctional devices

It is important to note that when participants discussed the accessibility issues relating to their use of ebooks on various multifunctional devices, their feedback was based on their global experience. Thus, their comments related to both the device on which they accessed ebooks, as well as any functionality enabled by the ebook reader software they used. Their feedback on the ebook reader is often impossible to disentangle from the device on which it is accessed because the device itself can enable certain functionality.

ebook readers for smart phones

Three participants in the ebook user sample used ebook reading software for their smart phones, namely: MobiPocket Reader for Blackberry Bold (A3); Bible reader from Olive Tree for Blackberry Storm (A5); iBooks for iPhone (A7).

Overall smart phones were perceived positively in terms of:

- portability, and
- general ease of use.

ebook reading experiences with smart phones though were described as awkward and uncomfortable, with users' sense of immersion in the story conveyed by the book being adversely affected. Accessibility of smart phones was reported to be compromised by small screen sizes resulting in:

- broken flow of text, and
- constant user interaction.

> **"It depends on holding the telephone a couple of inches from my face which is not comfortable for long periods of time.. And it's not big print. [...] Also [...] the page holds two to three words at a time so I'm continually pushing a button. It becomes irksome. You know when you're sitting down reading a book and you disappear into the world of the story? I've never had that [...] you can take notes [on the Blackberry Bold] but it's not very convenient. The online instructions are in miniscule print, I can't read it [...] It's not designed for "blindies"; it's designed for business people and things like that. So that's kind of good and also not good. And the worst features are the screen size, and in terms of reading for performance it just doesn't work. [...] Easy to use once the content is on the phone..."**
> **(A3, male, 35-44 years; onset at 24 years, level of sight [4])**

Mobipocket

The user of Mobipocket for Blackberry Bold reported being able to convert content that was not in a standard ebook format (such as HTML and Word) into an ebook format using this program.

> **"ebooks can be commercially available, or you can fudge your own by using various programs like MobiPocket, which will generate content which you can... for example, take an article from a website, and I can put that into my telephone and read that at my comfort. I will turn those into ebook format, but they are not themselves commercial ebooks."**
> **(A3, male, 35-44 years; onset at 24 years, level of sight [4])**

Positive features of Mobipocket noted by the participant who used it included:

- ability to enlarge some parts of the text;
- ability to annotate;
- ability to convert non-ebook text into ebook format; and
- general ease of use.

However, these positive features were compromised by:

- properties of the smartphone (screen size); and
- inability to enlarge the online instructions.

Olive Tree Bible Reader for Blackberry Storm

One participant used Olive Tree Bible Reader on his Blackberry Storm which he found convenient and easy to use.

> **"I've got a Blackberry Storm at the moment [...] on that is a Bible reader which is incredibly good because you can change the colours of the screen. If I'm in Church and I want to follow what's being said I can just read it on there, and it's quite quick to find the chapter and verse that I want."**
> **(A5, male, 44-54 years; onset from birth, level of sight [3])**

Positive features of the Olive Tree Bible Reader were reported as:

- ability to enlarge some parts of the text; and
- flexibility in colour contrast.

However, these positives were again mitigated by a number of accessibility problems:

- The interaction between the ebook reader and the interface, the Blackberry Storm, rendered ebook reading "fiddly" to use; and
- Inability to enlarge the menus within the Bible Reader program.

iBooks for iPhone

One participant reported having used iBooks for the iPhone, although in practice her Mac integrated screen reader was used for the majority of her ebook reading. She intended to make more use of iBooks once she had purchased an iPad. iBooks on the iPhone were

accessible to, and enjoyed by, this participant because the iPhone itself enabled:

- text to speech output; and
- text to speech descriptions of pictures.

This participant had repetitive strain injury (RSI) and found it uncomfortable to continuously interact with the iPhone to turn pages. Attempts to increase the the number of pages on the screen to reduce the frequency of clicking had been fruitless.

> **"iPhone? It takes me forever! You get about a paragraph on the page."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

Ebooks on iPad

Only one participant in the ebook user group used the iPad for ebook reading. However, almost all participants in the ebook user sample commented very positively on their perceptions of the iPad as a device for accessing ebooks, partly because Apple was perceived as a trusted, accessible brand.

> **"Apple are just so good at the accessibility stuff and it's built into everything. I just went… "I want one!" it's got Apple on it somewhere and I want one [...] Mac and Apple win hands down all the time because you go to the shop and they have people there trained to tell you about things, and the free tuition and things. You find with other bits of kit that other people haven't got a clue, and people make promises about things that they don't understand. They're not lying; they just say things that don't turn out to be true."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

Good features for ebook reading on the iPad were based largely on the features that participants understood were available on the iPad and included:

- flexible, text formatting options that could be personalised for their needs:
  - adjustable font size that can be enlarged to meet many users' needs;
  - adjustable font style;
- flexible screen display options:

- adjustable brightness and contrast;
- adjustable colour;
- uses LED backlit screen which does not flicker (go black) when the page is turned;

- 'Voice Over' text to speech output:
  - Compatible with iBooks for ebook content and menus;
- intuitive interface (low effort):
  - for instance, enabling the reader to flick (rather than click) through electronic pages in the same manner as would a reader of a book in hard copy format;
- ease of use;
- good portability:
  - compact and lightweight relative to bulky large print books which one participant described as being "the size of a gravestone each";
  - convenient/easy to hold;
- ability to annotate text;
- ability to open PDF formats; and
- silent performance:
  - useful for one participant's specific needs for studio recordings.

"...with the iPad obviously you just sit and turn it like you turn the pages of a book, which is not too challenging."
(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])

"with the iPad I can actually do the underlining and get all the relevant parts of the book that I wish to quote or whatever, in a format that I can use afterwards without having to rehear the whole thing or go through the whole book again to get the relevant quotes, or even write them out, I can do it through that technology."
(A4, male, 35-44 years; onset from birth, level of sight [5])

"I'm excited about the iPad, because it has a large screen and therefore it's equivalent to holding an A4 page with 20 point print on. And it doesn't rustle, or click, so you turn pages just by flicking the screen. That's a wonderful development. And it's also lean-back

> **reading as opposed to lean-forward. [...] But the exciting thing about the iPad is that you can open PDFs straight into the ebook format without [a lot of effort], and that will be amazing.[...] The iPad is LED-backlit, like a laptop computer, and it doesn't go black when you change pages"**
> **(A3, male, 35-44 years; onset at 24 years, level of sight [4])**

Only one negative comment about the iPad was raised. One PC user noted that the iPad could not be connected to any other of her devices. Its functionality would be improved if it could enable a non-Mac user to read their own stored ebook content, for instance, from a USB.

Kindle software on PC

Only one participant in the ebook user group, A6, had direct experience of the Kindle software for PC.

Positive features noted by the user included:

- good house font style with lettering spread slightly further apart than they would usually expect;
- some flexibility in colour contrast;
- flexibility in screen brightness and contrast;
- flexibility in modifying the column width of text;
- bookmarking capability; and
- annotation capability.

Negative features of the Kindle software included:

- inflexibility in changing the house font style (to their knowledge);
- insufficient range of colour contrasts; and
- inflexibility in changing the font size of annotations.

Adobe Digital Editions software on PC

Only one participant in the ebook user group, A6, had direct experience of the Adobe Digital Editions software for PC. This participant had chosen to download this software because it was free.

Positive features noted by the user included:

- greater flexibility in modifying brightness and contrast compared with the dedicated Sony ebook reader, as it is accessed via a PC;

- ability to enlarge the page as required;
- access to some PDFs;
- automatic column re-formatting enabling access to text in narrow column which reduces the need to scroll from left to right;
- bookmark capability; and
- annotation capability.

Negative features noted by the user included:

- inflexibility in changing the font style;
- lack of colour options;
- inflexibility in changing the font size of annotations; and
- inflexibility of increasing the size of the menus.

This user found it difficult to set up Adobe Digital Editions because of the inflexibility in the appearance of the menus and reported using a magnifier to support her access.

> **"The other advantage in both the software [Kindle and Adobe Digital Editions] is that you can bookmark things and write notes, so academically that's very helpful, but it completely falls down because you can't do anything about changing the font size. So it's fine, you can make a note, but then I can't read it. Just a tweak with the software and then it would be fine."**
> **(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])**

Adobe Acrobat Professional on PC

One participant (A1) reported using Adobe Acrobat Professional to access textbooks for academic purposes. Several participants reported wanting, or being able, to read ebooks and other material in PDF format.

Good features of this software highlighted by this participant included:

- ability to annotate;
- zoom function;
- ability to invert colours; and
- easy to use (and to learn to use).

Features that were less desirable were also noted, and included:

- poor flow of text when using the zoom function;
- excessive scrolling when using the zoom function;
- slow performance on occasion; and
- prone to crashing.

3.6 Ebooks using specialist assistive technologies

In one case, for participant A2, it was difficult to ascertain the ebook reader software used for her ebook reading. This participant had no light perception and mainly used two assistive technologies to read ebooks: BrailleNote, a specialist assistive PDA device, and Bookworm, an eight cell hand-held portable Braille reader device.

Alone, these would not constitute ebook readers in the context of this report. However, based on the participant's feedback these assistive devices enabled her access to ebooks from a recognised ebook distributor (www.ebooks.com) through ebook reading software, even though the participant's understanding of this software was not comprehensive.

For instance, BrailleNote has integrated support for Microsoft Reader software. This enables users to access commercially available ebook content in the Microsoft Reader format either through synthetic speech or electronic braille. RNIB recognise Microsoft Reader as mainstream ebook reading software; though acknowledge that it is no longer widely supported in the UK.

BrailleNote

Particpant A2 reported using a 20 cell BrailleNote for accessing ebooks. It was not clear to this participant how she accessed ebooks on this reader; Microsoft Reader was not mentioned, but she was aware that there was an integrated suite of applications called KeySoft which she believed included an ebook reader.

> **"It's got software in it, but apart from that there's... well there's something called KeySync [KeySoft] but you don't have to use that. If you're just trying to transfer a book over, it's got a compact Flash card and an SD card, and a USB as well so you can bung something on the USB stick and then bung it straight in there."**
> **(A2, female, 45-54 years; onset from birth, level of sight [0])**

Positive features noted about reading ebooks focused on the BrailleNote itself:

- Good portability;
- Intuitive and easy to use;

- Easy to correct mistakes;
- Good number of braille cells meaning that less user interaction is required to keep reading; and
- Easy to access guided help.

This participant used academic ebooks from www.ebooks.com on the BrailleNote device for her studies. She noted that using ebooks was of benefit to her for:

- improved navigation of books; and
- ability to cut, copy and paste text.

> **"For leisure I just put the [audio]book on and enjoy it, but for research you're looking for specifically what you want, so it's a bit different. So ebooks [using BrailleNote; ebook reading software not identifiable] are far more useful to me than any audio books could be. [...] you can create a document and cut, copy, and paste bits out of it."**
> **(A2, female, 45-54 years; onset from birth, level of sight [0])**

A few negative comments about ebook reading using the BrailleNote device were noted:

- cost of the BrailleNote;
- requires both hands to use.

Bookworm

The Bookworm was described by one participant as an eight cell handheld portable Braille reader device. The participant had purchased it because it gave her another way of reading books.

The participant was unsure about any specific ebook reading software on this device, but believed that Handy Tech software enabled her to transfer ebooks from her laptop PC to the Bookworm. She used the Bookworm for both leisure and study books from sources such as www.ebooks.com and Bookshare.

Positive features noted by this participant when reading ebooks with this device included:

- ease of use because it just reads books;
- lightweight and compact size for easy portability;
- quality of the braille output.

The following negative features were noted:

- limited functionality;
- outdated aesthetics;
- has potential to be more compact.

> **"[The Bookworm] is not that heavy or big or anything but you can't do anything else with it. With my BrailleNote, say I get tired and don't want to do any more reading, I can listen to the radio or go on the internet, whereas I can't do that with the Bookworm."**
> **(A2, female, 45-54 years; onset from birth, level of sight [0])**

Ebooks using screen readers

Participant A7 could access iBooks through her iPhone using VoiceOver. She also accessed ebooks from the ebook collection in her local library via Bloomsbury Library Online, which she read using the built-in screen reader on her Mac. Another participant, A2, reported occasional use of Kurzweil text to speech with ebook reading software.

3.7 Multifunctional compared with dedicated ebook readers

All participants in the ebook sample used at least one multifunctional device on which they accessed ebooks. Furthermore, there was almost unanimous agreement that a multifunctional device for accessing ebooks was preferable to a dedicated ebook reader. Participant A5 was the exception and did not classify himself as an ebook user despite using an ebook reader limited to a specific type of content (the Bible).

The main reasons for preferring multifunctional ebook readers were: perceived value for money, particularly given the relatively high cost of dedicated devices, and to reduce the number of devices that they carried around with them. Whilst many accessed ebook content on a fixed device, portability was flagged many times by participants as a desirable feature. Portable devices were reported as more conducive to relaxation and comfort than sitting at a fixed device, and could be used more flexibly.

> **"That's the problem with the other ebook readers,... I'd have to take that with me, plus other pieces of equipment with me when I travel. Because I don't drive everything has to be very compact. So it was the possibility of doing a lot of the computing work plus the ebooks and the iPod that's integrated. So I didn't have to take multiple machines with me to do various functions, I could combine functions**

in one machine and travel as light as possible. [Interviewer: And which of those were the most important factors in your decision to get an iPad for ebook reading?] Multifunctionality. [...] it has to be quite a sophisticated machine that does many things"
(A4, male, 35-44 years; onset from birth, level of sight [5])

3.8 Access to ebook content

Where do they access ebook content?

Some participants accessed books from multiple online and offline sources, whilst others stuck with one familiar source. Paid for and free sources, including content available with the ebook reader, were used. There was little consistency across participants in the ebook user sample in where they accessed their ebooks.

Sources specified by participants included:

- websites from the Sony site that offered free public domain books;
- direct requests to publishers;
- Project Gutenberg;
- Barnes and Noble;
- iTunes;
- Amazon;
- Waterstones;
- WHSmiths;
- www.ebooks.com;
- via links from the City of Edinburgh Council library website (such as Bloomsbury Library Online); and
- iBookstore.

Some distributers of ebook content were perceived as having wider collections than others. iBookstore was commended for having a large collection that is continuously updated. One participant found www.ebooks.com had a good variety of academic books for study purposes but thought that the website could be clearer for users in terms of aesthetics and information.

"[www.ebooks.com] is quite cluttered because it's designed for sighted people, and it's very difficult to know straight off whether the book you want has read aloud or accessibility features set up in

it. A couple of times I've bought a book and had to go back and say, "I can't read this, can I have a refund?"
(A2, female, 45-54 years; onset from birth, level of sight [0])

What types of material do they access?

Participants reported accessing a range of content for leisure, information, work and academic purposes. ebooks were accessed for bestsellers, "classics" and other novels, through to ebooks on specific topics such as academic text books and religious content.

What difficulties were reported in accessing ebook content?

The process of finding books through ebook searches was reported to be fairly straightforward. The search function on Waterstones, Amazon, iBooks and iTunes were reported to be easy to use.

"… you can easily do a search [on iBooks] but I was just browsing. But the search function is really quite easy as well, I was quite impressed."
(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])

Whilst the potential for wider availability of content was reported as a benefit of ebooks, in practice, several ebook users were disappointed by the availability of ebooks. Project Gutenberg was praised for its attempts to make digitally accessible a wide range of titles.

"Apart from classics it's [blooming] hard to find anything much. So… I don't think we're quite at the stage yet where when publishers bring out a print book they also bring out an ebook."
(A3, male, 35-44 years; onset at 24 years, level of sight [4])

"The only improvement I can think of at the moment is more accessibility to more titles."
(A4, male, 35-44 years; onset from birth, level of sight [5])

Poor availability of academic digital text from sources such as iTunes and Barnes & Noble was noted. Barnes & Noble were reported to use their own ebook reader, the Nook, meaning that the participant had to install additional software to access content from

their site. The participant was unable to name this Nook software. Whilst this enabled access to the required content, the participant was not able to annotate the text.

One participant who made direct requests to publishers complained about the speed of their responses to him, which he reported varied across publishers.

> **"One thing that would be quite useful is, when requesting academic books from publishers, they were much faster to reply. It varies hugely, for example Routledge reply often within an hour, fantastic, whereas Penguin can take up to six weeks which could be the end of the course."**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

3.9 Downloading

In general few downloading problems were reported by participants. Most participants skimmed over the topic. Some simply reported that they used accessibility aids such as screen readers or screen magnifiers with their computers to support the downloading process.

> **"[Interviewer: how do you find downloading, transferring?] Yep, I use a screen reader on my computer, I have no trouble doing that [for my Sony Reader]. I'm using a Mac which has a built-in screen magnifier, so I use that when transferring books."**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

One participant found the Sony Reader difficult to use for downloading because font size could not be increased and the terminology was somewhat confusing.

> **"Tricky [to download] on the Sony because the software has no flexibility for the font size, so I found that quite difficult and the information quite confusing, so that's a bit of a put-off from using it."**
> **(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])**

The Kindle and Adobe Digital Editions software for computers were reported to be more usable for downloading books than was the Sony Reader. Kindle software was considered easier to read compared with Adobe Digital Editions by one participant.

Re-locating stored files of ebooks using Kindle and Adobe Digital Editions software was difficult for one user. This participant was concerned about how to transfer ebook files from one PC to another device which she presumed was prohibited because of the potential for illegal distribution.

Downloading iTunes and iBooks was noted as very accessible by one participant.

> **"[How do you find downloading using iBooks?] Very easy. I was surprised how easy it was."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

Users of smart phones for ebook access were slightly less positive about the download process than others, largely because of the limited screen and text size.

3.10 General perceptions of ebooks

ebooks can improve comfort of reading

For some participants with residual vision, access to ebooks had brought pleasure back to reading. Several participants described how with progressive deterioration of their vision, reading had become more for necessity than leisure until they tried an ebook reader. Using ebooks reduced eyestrain for one partially sighted participant.

> **"...in my teens I read for pleasure. I started reading less and less as my eyesight got bad and I just would get headaches. I could still read 12-point text, or normal text, in a book, but I would get headaches fairly quickly so then it was reading primarily for academic reasons, which continued through university until very recently, when I got an ebook actually, and started reading for fun again."**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

Reading ebooks is engaging

For several participants, narrated audiobooks was a preferred format for leisure reading; it was reported to be easy to just sit back, relax and listen to books for leisure without the need to interact with a device by turning the pages of an ebook. They considered that ebooks required more effort to use than audiobooks.

> **"I suppose the main thing is that you have to be constantly interacting with the [e]book in order to really get to the next page. You just slap a CD in and get off, like you can with audiobooks. [Although with ebooks] If you were actually more interested in non-fiction than fiction, it's much easier zapping about."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

Conversely, because reading ebooks was considered more effortful and less relaxing than audiobooks, it was described as a more engaging reading method.

> **"Listening to books is much more passive, lots of people tend to fall asleep – so do I."**
> **(A2, female, 45-54 years; onset from birth, level of sight [0])**

Ebooks can be more cost-effective

Cost was perceived by some participants in the ebook user sample as a barrier to adopting certain ebook readers. Understanding the cost/benefit of different products was important to participants in this sample to ensure they invested in a product which met their needs. However, ebooks were a cheaper alternative to bespoke re-formatting for study purposes, and were easier to navigate than audiobooks in this type of context.

> **"it was cheaper to buy an e[book] reader than it was for the university to reformat two novels."**
> **(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])**

Ebooks could promote inclusion

The benefit of ebooks having the potential to increase availability and accessibility of mainstream book content increased one participant's sense of inclusion; it enabled her to access books that her sighted peers accessed, increasing social benefits.

> **"It would have the potential for me to be reading things that my friends are reading.[...] Quicker access to recently published things that would help with sharing things with family or friends, talking about things, socially really I think it's quite beneficial, I'd love to belong to a book group."**
> **(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])**

Ebooks could be more accessible

That several participants reported accessing ebooks using assistive technology in addition to ebook readers demonstrates that ebook readers are not yet fully accessible, or that these blind and partially sighted ebook users tend to use assistive technology tools with which they are familiar to access as broad a range of content as they are able.

> **"If they're done properly a blind person could access them [ebooks] from text to speech or large print or… varying the size of print, having it talk to you, having a portable device with books on that you can read. It's potentially very accessible but I'm not sure how accessible they are at the moment."**
> **(A5, male, 44-54 years; onset from birth, level of sight [3])**

> **"I feel the whole industry missed a trick from the start, it feels they hadn't considered people with visual impairment which seems so crazy. Building these things, you think they'd think, "There must be a market out there, we must find out what they need," and it seems like they're catching up by being persuaded, that's really frustrating."**
> **(A6, female, 45-54 years; onset in left eye from birth, nystagmus at 21 years, level of sight [5])**

4 Research results for non-ebook users

4.1 Summary of reading devices and preferences

Participants in the non-ebook user group used a variety of methods for reading, but most reported that of the methods they used they preferred audio, particularly for leisure reading. In addition to the benefit of accessibility for people with no vision, one of the benefits of using audio formats identified by participants was that it gave them the opportunity to multitask, for instance, to exercise whilst listening to a book.

Audiobooks on DAISY players were used by four of the five participants in this group for leisure reading at home and, for those with portable DAISY players, whilst out and about. The convenience of the postal Talking Book service was appreciated: RNIB send through the disks, the player can be paid for by social services, the voice speed of the audio output can be altered and it is multifunctional in that music CDs can also be accessed using a DAISY player.

Key needs from this sample were convenience, ease of use, and comfort with lower-tech solutions, which were met by their existing reading methods. However, some participants reported that they have scanned hard copies of books into their computer for reading with a screen reader, suggesting that some are relatively comfortable using digital formats they are familiar with.

Below, background information about reading is summarised for each non-ebook user.

Participant B1, female, 55-64 years; onset from 42 years, level of sight [2]	
Importance of reading and types of content	**"It's very important"**: reads for leisure (local history), information, and practical purposes
Reading methods/devices/aids used	Braille; audiobooks using portable DAISY, cassette (for local newspaper) and CD (for Talking Newspaper UK) players; screen reader (Hal)
Reported preferences/why	Braille for information, because it is durable in contexts that participant tends to read in. DAISY, for leisure
How participant found out about ebooks	Channel Five's 'Gadget Show'; Radio 4's 'In Touch' programme; in a magazine that accompanies DAISY CDs when they are sent in the post; Sight Village exhibition

Participant B2, male, 55-64 years; onset from 32 years, level of sight [2]	
Importance of reading and types of content	**"It was very important [...] since the sight loss it's still important but "not as important."**: reads" for leisure and information
Reading methods/devices/aids used	Audiobooks using DAISY and CD players; screen reader (Guide); wife reads a lot to B2; wife has iPod and is learning to download audiobooks onto it
Reported preferences/why	DAISY, because you can speed read and it was free (paid for by social services)
How participant found out about ebooks	RNIB

Participant B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3]	
Importance of reading and types of content	**"Very"**: reads newspapers, journals, technical content
Reading methods/devices/aids used	Audiobooks using iTunes on iPod; screen reader (Natural Reader)
Reported preferences/why	No preference
How participant found out about ebooks	General media: Channel Five's 'Gadget Show' and BBC's 'Click'; Radio 4's 'In Touch' programme

Participant B4, female, 45-54 years; onset at 20 years, level of sight [3]	
Importance of reading and types of content	**"Important, yeah"**: reads for leisure and work
Reading methods/devices/aids used	Audiobooks using DAISY player; large print on computer (ZoomText); CCTV
Reported preferences/why	Audio, **"because I can't read a lot of text under a magnifier"**
How participant found out about ebooks	Word of mouth

Participant B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1]	
Importance of reading and types of content	**"Extremely important; very very high priority"**: reads for information, pleasure and academic/work purposes
Reading methods/devices/aids used	Audiobooks using DAISY player; screenreader (JAWS) on laptop, and JAWS on PAC Mate portable Braille Display
Reported preferences/why	Audio (DAISY) for pleasure, because it's relaxing
How participant found out about ebooks	Amazon website; the radio and RNIB

4.2 General perceptions and expectations of ebooks

Compared with the ebook user group, the non-ebook user sample was generally less knowledgeable about ebooks and their perceptions and expectations about what ebook readers could offer appeared to reflect this.

General positive expectations of ebooks reported by non-ebooks users can be summarised as:

- improved portability:
  - convenience of a lightweight device;
- potential to support social inclusion
- enable a wider range of texts to be accessed:
  - including out of print text;
  - lower cost of book titles.

Portability

The majority of non-ebook using participants focused on portability and the convenience of a lightweight device that could be used both at home and whilst on the move.

> **"It's a little travel pad thing and you can download books and novels on it, and you can turn pages electronically."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

Potential to support social inclusion

One participant in the non-ebook user group (B5) perceived that the trend toward ebook reading could break down barriers between sighted and blind/partially sighted readers. This is somewhat consistent with comments from one of the ebook users who indicated that ebook readers have potential to promote social inclusion.

> **"...an ebook would be fantastic if I could access it. That would be really wonderful, because then you've got access to the world, haven't you?"**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

"I suppose in a normalised way really, as electronic reading becomes much more common generally, it actually becomes less stigmatised."
(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])

Access to a wide range of book titles

Several participants recognised that because ebook readers have a large potential market compared to assistive technologies, benefits to blind and partially sighted people of ebook readers could potentially include an increase in the range of books available to them. Furthermore, because there are now ebook readers in the mainstream, some participants considered that the cost of accessing books could decrease.

"If it was there as an ebook on a player and I could access information as and when I wanted to, I could see that being quite handy because there's no way such a book would be brailled or turned into a DAISY book because there's just not the audience for it."
(B1, female, 55-64 years; onset from 42 years, level of sight [2])

"I've always found with audio books, the kind of books that I read are very, very limited, and every time I see a new title come on, on the telly or something, I think, "Oh, I'd like to read that," and it's just not available. Whereas hopefully in e-format there won't be any reason why any of them shouldn't be available, should there?"
(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])

Incompatibility of ebook formats

Whilst the majority of non-ebook using participants perceived ebook readers as facilitating increased availability of book titles, one participant expressed concern that dedicated ebook readers would be limited in the formats accessible to the reader; ebook readers that enabled unrestricted access to content would be preferred. This concern was also raised in the ebook user group.

> **"...iBooks – any of these things, like Amazon, you're restricted to buying things from Apple or iTunes, the same with the Kindle, you're limited to using the Amazon. If these were a bit more generic and you could use them the same way... it'd be like me just being able to buy books from Waterstones, wouldn't it? I think that's quite limiting."**
> **(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])**

4.3 Multifunctional compared with dedicated ebook readers

Dedicated ebook readers with which the sample were familiar included the 'Sony' and the Kindle, which was also referred to as 'the Amazon'. One participant had also heard of the Iliad ebook reader (company no longer trading) and that Google were about to launch their own ebook reader.

Many participants in this non-ebook group were less familiar with ebook reading software on multifunctional devices than they were with dedicated devices. Software noted was the iBooks for iPad.

> **"[Have you considered trying software?] No, because I didn't know it existed."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

> **"I haven't heard about accessing it on the telephone until you just mentioned it."**
> **(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])**

Generally, participants in this sample appeared to be warmer towards the standalone ebook readers or on multifunctional portable devices than to ebook reading software with a fixed generic device, such as a PC. This partly appeared to relate to their interest in having portable products, which they perceived would be enabled through dedicated ebook players, and also because they were less familiar with the concept of ebook reading software.

> **"Haven't really thought about that [ebook reading software for PC]. I think it's the mobile thing, I'm so used to listening to my books on my iPod, I don't really think that if I was going to sit and listen to a book I would really want to be sat at my PC, I'd want to be sat on a bus or a sofa or whatever. Worth a try but I've never thought about it."**
> **(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])**

Compared with the ebook user group, participants in the non-ebook user group were less sure how to respond when asked directly whether they preferred the idea of a dedicated ebook reader to ebook reading software on a multifunctional device.

Responses were varied:

- some recognised the benefits of a portable multifunctional device;

> **"...you're not having to carry a whole range of gadgets, one pocket for your mobile phone and another pocket for your ebook reader, it fits easily and you don't want your handbag full of technology."**
> **(B1, female, 55-64 years; onset from 42 years, level of sight [2])**

- others preferred the perceived simplicity of a dedicated product;

> **"I'd be quite happy if I could just get away with it reading books because I've got lots of other bits and pieces for doing things."**
> **(B2, male, 55-64 years; onset from 32 years, level of sight [2])**

> **"Just ebooks. [Interviewer: Why is that?] Because multifunctional gadgets are quite difficult to navigate."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

- one participant preferred a dedicated product that was compatible with other equipment they used.

> **"If I could combine it with my existing equipment I would prefer that, if it was a specific piece of equipment I probably might like it to have some other limited facilities. I've got most of the equipment at the moment which does what I need."**
> **(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])**

4.4 Potential barriers to adopting ebooks

Ebooks perceived as not accessible to blind and partially sighted people

All participants raised concerns about whether there were products in the ebook reader market that would be accessible to blind and partially sighted users. Issues raised in this regard included concerns that:

- users would need to rely on others to get the ebook reader to work;

> **"The ebook reader for me would have to be totally accessible. For me, there's nothing worse than having a gadget and you've got to get someone to see what they're doing to load it up and actually work the thing for you."**
> **(B1, female, 55-64 years; onset from 42 years, level of sight [2])**

- ebook readers would be inaccessible to people with no vision because text to speech output would not be available;

> **"I've not tried anything with ebooks because I'm not convinced they're blind-person friendly [...] You've got to have sight to use them because there's no spoken menu or anything like that, that I know about anyway"**
> **(B2, male, 55-64 years; onset from 32 years, level of sight [2])**

- ebook readers may not be compatible with assistive technologies used;

> **"I haven't gone into it a lot, but in respect of the ebooks, I believe that I would have to have some additional or specialist equipment. I haven't actually researched that myself yet. The other thing is that I'm not sure whether the equipment that I have would be adaptable, or whether I would need to get another piece of equipment."**
> **(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])**

- if ebook readers enlarged text to the desired size, they would not be of any practical use because you would only get a few words per page.

> **"[my friend] thought [an ebook reader] would be the answer to all my problems, and then I discovered it wouldn't at all. [Interviewer: did you do any research?] No, not really. He'd been somewhere and was telling me about them, and then I discounted it [...] Well, he said that you could enlarge the font, but even if you could enlarge it to 40 you'd only fit two letters on the little screen so there didn't seem any point investigating.[...] I don't think it's of any use."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

> **"...an ebook would be fantastic if I could access it. That would be really wonderful, because then you've got access to the world, haven't you? But I don't think I can access it. [...] I'm sure, because you can enlarge the text, so some people that can read a slightly larger font size, they'd be fine, but for me they're not."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

Unlike the ebook users who appeared rather proactive in finding out information about which models might best meet their needs, many participants in the non-ebook user sample were unsure about what products were available and what they offered, and they had not actively searched for more information.

> **"[Interviewer: Have you done any research on it yourself?] Erm, not overly. I just went up to the shop. I made a record of the names. [...] [Interviewer: What information do you need to know before deciding whether or not it would be useful to you?] Just that they would be accessible to me. I need to know whether I could work my way**

around it, to use it, to get the books onto it."
(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])

Ebooks could be too 'technical' and not very easy to use

Participants' less proactive approach in searching for information about ebooks might be because they were not yet ready to purchase an ebook reader but it could also relate to other factors. For instance, compared with the ebook user group, the non-ebook user group tended to be slightly older and had lower confidence in using technology.

Some participants appeared to have some difficulty from time to time using computers and associated accessibility software. This perception could generalise to ebook readers if they are perceived as too technical. Indeed, some reported that they were concerned that ebook readers would be difficult to use.

Comments made by participants in this group, as shown below, indicated that they:

- were still a little unfamiliar with some technologies;

"I suppose, I've come to screen reading much later than some other people because the younger people would go straight into that from school, would they? But I'm getting better with the computer now."
(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])

- tended to have problems using technology;

"The thing is with screen readers and computers is that they're so badly behaved – well, they can play up."
(B1, female, 55-64 years; onset from 42 years, level of sight [2])

- used text to speech software with low functionality; and

"[Natural Reader] is basic, I've not quite got into the realms of the actual more functional software out there like JAWS or ZoomText or what have you. It's kind of a stepping stone for me that I wanted to try this."
(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])

- were concerned they would make mistakes when making online transactions.
    - This suggests that purchasing ebook content could also pose difficulties for some participants in this group.

> **"If a catalogue has come into the house, well I can't read the catalogue, but I'll go onto the online version and get Hal [a screen reader] to read through the descriptions and the price lists, and then I'll get Hal to find the phone number and I'll phone them up. That's basically because I'm a bit nervous about ordering online in case I ended up ordering 10 instead of one!"**
> **(B1, female, 55-64 years; onset from 42 years, level of sight [2])**

Ultimately, for many in the non-ebook user group, it appeared that fear of the unknown and of technology in particular was a hurdle to adoption; some perceived that they lacked the confidence and skill required to use new technology.

> **"From what I know about them, general information, they sound quite difficult."**
> **(B2, male, 55-64 years; onset from 32 years, level of sight [2])**

> **"I think it's just fear of technology, [...] If you're dealing with someone my age, or someone who's developed sight loss in their 70s, they are going to be quite nervous of trying anything like that. I know speaking for myself, amongst sighted people I know locally, it's surprising how few of them who use computers, mobile phones, anything like that. I know they talk about silver surfers but I don't know where they are, they're not in rural Scotland!**
> **(B1, female, 55-64 years; onset from 42 years, level of sight [2])**

Ebook readers are too expensive

Concern was expressed about the cost of an ebook reader particularly one which had accessible features such as text to speech output. The cost/benefit of an ebook reader was also questioned by one participant, given the low cost of print books.

> **"Cost, I suppose, really. When you've got to shell out a couple of hundred quid to just read a couple of £5 books, that's a big expense isn't it?"**
> **(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])**

Some participants reported that they would be likely to wait until the cost of ebook readers had come down and teething problems associated with earlier models had been dealt with.

> **"[Interviewer: Have you done any research on it yourself?] Not at the time because I thought, "That's going to cost money," and I'll wait until I've heard there's definitely one that's 100% accessible. [...] I always think once things come under £100 maybe I'll start thinking about them."**
> **(B1, female, 55-64 years; onset from 42 years, level of sight [2])**

One participant suggested that if the purchase of ebook readers was financially supported by the RNIB Talking Book Service, that this could facilitate adoption of ebooks.

> **"...there might be a problem with cost of that equipment, the funding of that. It might limit certain people who, economically, might not be able to purchase it if it was not put out on loan like the Talking Book service. I suppose that applies to everyone really, but I think there may be some disadvantage, some economic disadvantage unless there was some financial support."**
> **(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])**

No interest in ebooks: other methods meet needs

For some, there was low interest or they had yet to be "convinced" that ebook readers would be for them; many perceived that the barriers outweighed the potential benefits even though most were apathetic about finding out more about them. Only one participant in the non-ebook user group (B5) indicated any serious interest in accessing ebooks.

> **"[Interviewer: Have you considered trying an ebook?] No, I haven't at this point, but I plan to. As I say, this is my next venture [...] I suppose, I just didn't have time previously to develop any other methods that I've [been] using. [...] I'm semi-retired now, so I've got more time now. Just managing to keep up with a full-time demanding job didn't give me a lot of time to look at things other than what I was doing. I would have done, presumably, as time went on, but it takes time to cope with the effort."**
> **(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])**

4.5 Summary of the non-ebook user results

To summarise, participants in the non-ebook user group used reading methods that were convenient, easy to use and lower tech. They were generally less knowledgeable about ebooks compared with to the ebook user group though had similar expectations about what ebooks could offer: improved portability, supporting social inclusion and enabling a wide range of texts to be accessed. However, they expressed a range of concerns about ebooks including the perception that ebooks would be inaccessible to blind and partially sighted users, and if they were accessible that they would be too expensive. They were also concerned that ebooks could be too technical and not very easy to use. Many were comfortable with their familiar reading methods and were not sufficiently driven by the positive expectations of ebooks to change them.

5 Summary: key features that blind and partially sighted people would like from ebook readers

Themes that emerged from both groups as key accessibility requirements from ebook readers for blind and partially sighted people included: flexible text display; level of interaction required; text to speech output, and screen size and display.

Key general requirements related to ebook file formats, portability, ebook content management; access to ebook content including cost; ergonomics, aesthetics and purchase support.

5.1 Flexible text display

For those with any residual vision, the ability to manipulate text size for ebook content, menus and any annotations where available, was an important accessibility feature of ebook readers. For some users their text size needs varied throughout the day.

Key requirements in relation to text display, include:

- Subtle font size manipulation;

> **"At the moment I've found a reader that does have a fairly large range, but the way it works at the moment you select categories, small/medium/large/extra large; if there was, for example, a slides than you could just slide towards or away from larger that would be more accessible. I often find that what I'd like is something between large and extra large."**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

- Font style selection (including availability of sans serif styles);
- Variable spacing between characters;
- Ability to display text in narrow columns;
- Ability to invert colours and wide range of colour contrast options.

5.2 Low level of interaction with device

Linked to the need to be able to manipulate the amount of text presented on one page, is the need to reduce continuous interaction with the screen (key clicks) if it was awkward or caused discomfort.

> **"I have a problem with RSI [repetitive strain injury], so anything I can do to cut down the number of keystrokes that I use is very welcome. I was trying to find some way [using a Mac's integrated screen reader] to read two pages side by side [on Bloomsbury Library Online], and it just doesn't seem to want to do that."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

5.3 Text to speech output

Key requirements in relation to text to speech output, include:

- Text to speech output for both book content and menus;
- Compatibility with existing text to speech software, as per user preferences;
- Preference/tolerance for synthetic speech varied across participants.

> **"[interviewer: What things do you/would you look for in the perfect ebook reader?] Whether they could talk me through the instructions and the menus and how to go about downloading, and all that sort of thing."**
> **(B2, male, 55-64 years; onset from 32 years, level of sight [2])**

> **"[What would put you off getting that type of ebook reader?] It would depend on what the voice was like. I'm so used to the nice lady on the iPhone and the nice man on the computer."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

5.4 Screen

Requirements with regard to screen display varied depending on whether the participant had any residual vision. For participants with any vision, key requirements in relation to screen display, include:

- Screen size maximised, capitalising on the size of the device;

> **"I found this particular BlackBerry [Storm] with a big, incredibly high resolution screen, and that's really what made me go for this one."**
> **(A5, male, 44-54 years; onset from birth, level of sight [3])**

- Low glare on screen;
- High clarity and resolution of screen;
- Ability to change brightness and contrast;
- No screen flicker, for instance, when page turning (attributed to e-ink displays).

> **"And there's a moment when a page goes black when it refreshes, and that's a little bit inconvenient especially if you want to keep reading."**
> **(A3, male, 35-44 years; onset at 24 years, level of sight [4])**

In contrast, for those with less functional vision, the screen was less important.

> **"I wouldn't want anything too big and bulky. Doesn't really need a decent screen as I wouldn't be able to read it so much."**
> **(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])**

5.5 Ebook file formats

Key requirements in relation to ebook file formats, include:

- Better compatibility of ebook file formats across ebook readers;

> **"...for me it would be easier if people could agree on standards, so you've not got to get 15 different types of reader for 15 different types of epublication, it all takes time, that kind of thing."**
> **(A4, male, 35-44 years; onset from birth, level of sight [5])**

- Ability to access PDF files and good flow of text in the display of content in this file format;

> **"I think e[book] readers do need to improve in tackling PDF files, which seems to be where most digital content online is if it's not in the EPUB [format] [...] I waited a long time before there was one [the Sony Reader] that could read PDFs and enlarge their text, because I knew that would be the format my textbooks would be in."**
> **(A1, male, 18-24 years; onset at 16 years, level of sight [5])**

- Ability to change the format of the file to suit personal needs.

5.6 Portability

Many participants preferred a portable ebook reader to ebook reading software on a fixed device such as a PC or Mac because they could use their ebook reader more flexibly depending on the context. ebook reading on a fixed device was not considered to be relaxing.

> **"...to read on a computer screen you have to lean forward and that's not comfortable. The thing about an ebook is that you lean back and read. I just find it easier on a phone."**
> **(A3, male, 35-44 years; onset at 24 years, level of sight [4])**

Key requirements in relation to portability, include:

- Lightweight;
- Not too bulky (easily fit into a bag);
- Good memory capacity;
- Good battery life;

> **"A good memory, a good battery life, long battery life."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

- Multifunctional to save carrying multiple devices for different functions.

5.7 Ebook content management

Key requirements in relation to content management, include:

- Good navigation features:
  - next/previous page/chapter;

> **"If you were actually more interested in non-fiction than fiction, it's much easier zapping about from one bit of the book to [another] [...] ebooks do have some sort of advantage there."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

- Ability to annotate book content (particularly for work/study contexts);
  - Ability to access annotations (as per 5.1 and 5.3)

> **"...it might be quite useful if it had some kind of a notetaker on it as well, particularly if you're accessing books, academic books for instance, where you may want to take notes or jot down."**
> **(B5, female, 55-64 years; onset from birth but sight affected at 15 years, level of sight [1])**

5.8 Access to ebook content

Key requirements in relation to accessing ebook content, include:

- Cheaper access to ebooks:
  - For instance, full cost of a hard copy could include an ebook version, and ebook only purchase could be made at a discounted rate;
- Easy to buy ebook content;
- Easy to generate own ebook content.

5.9 Ergonomics

Key requirements in relation to ergonomics, include:

- Easy to use:
  - Controls (eg, buttons) that are large enough to use
- Improved standards for interface design or best practice guidelines;
- Easy/comfortable to hold/carry for portable use;
- Control of sound features and minimal ambient sound:
- Specific feature required for the particular needs of participant A3 who worked with ebook readers in a recording studio.

> **"It would be quite nice if they started sticking to a plan, like, the enter button is always going to do such and such, that would be quite useful."**
> **(A2, female, 45-54 years; onset from birth, level of sight [0])**

5.10 Aesthetics

Key requirements in relation to the aesthetics of ebook readers, include:

- Aesthetically desirable accessible products;

> **"And the whole thing of how it looks, image-wise, that it's discreet and you can use it without having half a ton of metal on your arm."**
> **(A4, male, 35-44 years; onset from birth, level of sight [5])**

> **"it would be lovely if it looked nice, sort of stylish..."**
> **(B4, female, 45-54 years; onset at 20 years, level of sight [3])**

5.11 Purchase support

Key requirements in relation to purchasing support, include:

- Ability to try out different ebook readers before purchasing;

> **"I'd like to touch one [Kindle ebook reader], you know? It's all very well hearing about things. You can't sort of buy one and send it back, have a go and send it back, and as far as I know there's nowhere where you can go and actually play with one. [...]."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

- Free ebook reader software, with potential to pay to upgrade for more functionality if required by user;
- High quality product support and training:
  - For instance, that is tailored to the needs of blind and partially sighted people

> **"It's very difficult to get people to show you how to use things. I find that sighted people are absolutely rubbish, they're terrible at trying to explain or help you access the tech[nology]. Obviously they're professional but they don't seem to get that you can't access the stuff in the way that they do."**
> **(A7, female, 45-54 years; onset from birth but problematic since 30 years, level of sight [0])**

- More independent, trusted and platform neutral information about, and evaluations of, the range of ebook readers available on dedicated and multifunctional devices (eg, through RNIB), including face to face demonstrations.

RNIB was considered to be a trusted information source for blind and partially sighted people seeking support for new technologies. Some participants considered that RNIB could do more to inform them about ebook readers, for instance, by hosting a roadshow or by providing RNIB or user generated reviews on the RNIB website. It was also suggested that the RNIB Talking Book Service could include ebook readers.

> **"In some ways I wish – there must be some way the RNIB could [do a] roadshow thing, or there was somewhere you could go to get this**

advice quite simply and get demonstrations for these things. I find that trying to get hold of the right information from the right place is quite tricky."

(B3, male, 35-44 years; onset from birth but diagnosed at 19 years, level of sight [3])

6 Conclusions

This scoping study was commissioned to understand the current needs and activities of blind and partially sighted people in relation to reading ebooks. Using semi-structured telephone interviews with seven ebook users and five non-ebook users, accessibility issues identified by users of ebook readers were explored, and more general perceptions and expectations of blind and partially sighted people from ebook readers were reported.

Overall, participants from both groups greatly valued reading and used a wide range of methods and devices to support their reading.

6.1 What constitutes an 'ebook' and 'ebook reader' is complex

RNIB's focus on ebooks is to improve access for blind and partially sighted people to mainstream books available from ebook stores selling in the UK. The majority of such ebooks are DRM-protected and can therefore only be read on commercial mainstream ebook readers or software, such as Adobe Digital Editions, Apple's iBooks, the Sony range of Readers and the Amazon Kindle platform.

However, in practice, the wide range of ebook formats available (protected and unprotected) and their compatibility (or lack thereof) with an equally wide range of ebook readers (hardware and software, mainstream and specialist); means that the ebook landscape can be confusing.

Some participants used assistive technologies such as screen readers to read unprotected ebooks in formats such as PDF, and considered themselves to be ebook users. For such participants, the only benefits of using a mainstream ebook reader would be to access DRM-protected content. Our research suggests this fact is not clear to all blind and partially sighted people, and that a clearer understanding in this regard would be valuable to many blind and partially sighted people.

6.2 Incompatibility of different ebook file formats is problematic

That some file formats were not compatible across different types of ebook readers was off-putting to many participants in this research. For some, this was a barrier to investment. Many were optimistic that this fairly significant compatibility problem (different file formats read by different devices) would be resolved with time.

6.3 Ebooks could support social inclusion

Some participants perceived that ebook readers could enable blind and partially sighted readers to access the same range of book titles as their sighted peers, supporting social inclusion.

6.4 Ebooks are perceived as particularly useful for work and study

For leisure reading, many participants from both groups reported a preference for audiobooks because it was more relaxing and required less user control.

In contrast, the functional benefits of ebooks were better realised when accessing textbooks for academic, work or study purposes. Compared with audiobook formats, participants using ebooks reported having wider availability of textbooks at lower cost because ebook readers could read a wide range of file formats, and they were better able to navigate and annotate book content.

6.5 Ebook readers varied in meeting users' different accessibility needs

Many participants in the ebook user group used at least one type of ebook reader. A wide range of accessibility issues (positive and negative) were identified by ebook users. The significance of these issues varied from one ebook reader to another, and from one ebook user to another, depending on their accessibility needs.

Across the range of dedicated and multifunctional ebook readers, the main issues raised by blind and partially sighted users based on their experiences of ebooks related to: ability to manipulate physical properties of the text, in particular, size, font and colour; extent of portability, screen size; screen glare; screen flicker on page turning; and compatibility of ebook reader with different file formats.

Several participants discussed accessing ebook files with the support of assistive technologies. This suggests either that ebook readers are not sufficiently accessible at present, or that blind and partially sighted people who use assistive technologies will tend to use the assistive technology tools with which they are familiar to access as broad a range of content as they are able.

6.6 Compatibility of DRM-protected ebook readers with assistive technologies

A number of participants used specialist assistive devices on which they accessed ebooks, such as BrailleNote, or used existing accessibility software like text to speech on a commercial multifunctional device. These users' access to ebooks would be widened if ebook file formats were accessible to assistive technologies, even when the files themselves are DRM protected.

6.7 Preferences for multifunctional/dedicated devices vary

Overall, amongst the ebook user group, ebook readers on multifunctional devices were preferred to dedicated ebook readers. Indeed most ebook users found that dedicated ebook readers could not entirely meet their needs. ebook readers on multifunctional devices were preferred because they were perceived to offer better value for money, and portable multifunctional devices reduced the need to carry lots of different equipment with them whilst out and about.

For the non-ebook user group, preference was divided more equally. Whilst multifunctionality was considered useful by some, for others, it implied increased complexity.

6.8 Blind and partially sighted non-ebook users perceived ebook readers to be inaccessible

Whilst non-ebook users noted that ebook readers had future potential to offer a wider choice of book titles to all, they considered that currently available ebook readers would not be accessible to blind and partially sighted people. Several factors appeared to influence this judgement.

First, non-ebook users were generally less familiar with the range of ebook readers, and showed low awareness of ebook reading software; they were less aware of the range of flexibility in accessible features on different ebook readers.

Second, as a group, they tended to be less confident with technology and their comments suggested that they perceived ebooks to be overly complex and too technical for their abilities. Thus, even if they knew that ebook readers could be accessible, fear of technology could have influenced their perception of usability.

Third, the non-ebook using sample tended to be older with less usable vision and from what they understood about ebook readers they considered them to be largely reliant on vision, without the option of text to speech.

Other barriers to adoption identified in this sample were perceived poor ease of use; high cost; and low interest in ebooks because they were satisfied with their existing reading methods.

6.9 Clear communications on the benefits of ebooks for blind and partially sighted people

As demonstrated by the other themes drawn out in this report, and highlighted in the conclusion, we have identified substantial gaps in understanding and awareness of what constitutes an ebook and what differentiates ebooks from other electronic text formats – even amongst ebook users.

This is a key finding, because electronic text formats are generally perceived to be accessible to many blind and partially sighted people through assistive technologies – either accessibility functions built into mainstream products and services, or specialist assistive software and/ or devices.

It is of course important to promote the necessity of accessible ebook readers, and in so doing lobbying activities would need to focus on properties of the font; text to speech output, the screen display; ebook file formats, portability, ebook content management; ebook content access; ergonomics, aesthetics and purchase support. However, for blind and partially sighted people to benefit from more accessible ebook readers there is also a need to communicate their key benefit – access to DRM-protected content; ie the majority of new books published.

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9 Appendices

9.1 Appendix 1. Discussion Guide

1. Introduction

a. **(Flexible, may be more informal depending on previous level of contact with the participant, eg if calling at pre-arranged time).** Hello, my name is [Ellie Ratcliffe]. I work for a company called i2 media research, based at Goldsmiths, University of London. I am conducting some telephone research on behalf of the RNIB about what blind and partially sighted people feel about ebooks. Do you currently access, or have you previously accessed, ebooks - either using a dedicated device, like the Amazon Kindle or the Sony Touch, or using ebook reading software (for example Adobe Digital Editions, iBooks on the iPhone, iPod Touch or iPad, or Stanza)? If YES, go to c., else go to b.

b. Have you thought previously about accessing ebooks, even if you have not yet become a user? If NO – thank and END here. If YES, go to c.

c. Would you would be willing to answer some questions I have got about ebooks – what you think of them, what you like and don't like about them? The interview will take about an hour. If now is not a good time, perhaps I could arrange another time?

d. The purpose of the interview is to help the RNIB meet the needs of blind and partially sighted people in relation to reading. In order to do that, this interview will be recorded, and later typed up. Your name will not feature in the report, and you will be indentified by your gender, age, and level of sight loss only. Can I ask if you're happy to be recorded during the interview?

e. RNIB would also like to understand whether your requirements in relation to reading, and particularly reading ebooks, change over time. As such, RNIB may call you again in future to repeat the interview. We will be using this information to improve our understanding about the ways in which people access books, and to inform RNIB's discussions with industry to improve the accessibility of ebooks and ebook readers. Are you happy to continue with the interview, and to be contacted again for another interview in the future? I may need to move the interview on at various points, for example if we are going off topic, to make sure we cover everything we need to – so apologies in advance.

f. Throughout the interview I'll refer to 'reading', 'reading materials', and 'reading methods'. By 'reading' I mean accessing text in any format such as print, Braille, audio or electronically that sighted people can access visually. By 'reading materials' I mean different types of books [also include magazines and newspapers if they are brought up by the participant] that you might read for leisure, work, reference, and so on. And by 'reading methods', I am interested in the formats (for example large print, Braille, or audio) or tools (for example, Talking Books, magnifiers, and screen readers)that you may use to help you with your reading.

g. Are you ready to start? [If yes, start recording].

h. Background questions:

i. Could you please confirm your age for me?

ii. Which of the following describes what you are able to see?

1. Prefer not to answer
2. No light perception
3. In a room during daytime, you can tell by the light where the windows are
4. You can see the shapes of the furniture in a room
5. You can see well enough to recognise a friend if you get close to his or her face
6. You can see well enough to recognise a friend who is at arm's length away
7. You can see well enough to recognise a friend across the room
8. You can see well enough to recognise a friend across the road

iii. From what age have you had your sight condition? [If applicable: how long have you been affected by your sight loss?]

2. General reading

I'd like to ask you a little about your general reading experiences.

a. For what reasons do you usually read? [Leisure, work, faith, special interests, personal]
b. How important is reading to you?
c. What formats do you read? [for example large print, Braille, or audio]
d. What tools do you use to help you read books? [Magnifiers, asking for help, text-to-speech, Braille devices, electronic readers, audio cassettes/CDs, MP3 players, DAISY players…]
e. Do you use these at home, at work, or when you are out and about? If so, do you use different methods for different situations?

3. Different reading methods [to keep note of whether this section takes a long time, possible to drop if it extends the interview and stops the interview getting to the core ebooks questions]

a. You mentioned that you use [insert methods from section 2d here] to help you read. What are the pros and cons of each method? Are there any things that you're able to do using different reading methods that you value? Do you have a preference for any particular reading method? Why?
b. Are there any things that you think people reading standard print can do that you can't do so well? What stops you from being able to do that? Can you give me any recent examples?

c. What types of material do you find most easy to read using the methods available to you? Why?

d. What types of material do you find most difficult to read using the methods available to you? Why?

e. Do you ever get any other people to help you with reading any material? Can you give me some examples? What do you think would help you read more independently, without the help of another person?

f. Have you heard about any technology/techniques that you don't currently use that you think might enable you to access reading material more easily? Can you tell me about it/them? Why would it be helpful? What's stopped you from getting and using it so far?

4. ebook experience

You've talked about some of the ways that technology helps you read books, and I'd like to ask you about that in more detail.

a. In relation to reading, what do you know about ebooks? What do you think they offer to blind and partially sighted people that other methods of reading books do not?

b. In the rest of the interview I may refer to 'ebooks' and 'ebook readers' from time to time. I'm just going to define these two things; an 'ebook' is an electronic version of a printed book which can be read on an 'ebook reader', which can be on a personal computer (desktop, portable) or mobile phone using appropriate software, or on a device designed specifically for this purpose (such as Amazon's Kindle reader or Sony's range of Readers).

c. Do you read ebooks?

   i. If yes, assign to USER group;

   ii. If no... Have you ever used ebooks in the past, apart from a demonstration, but not now? [If no, assign to NON-USER group. If yes, note but still assign to NON-USER group.]

5. For participants in USER group

a. General ebook experience...

I'd like to ask you about your experience of reading ebooks.

   i. Why did you start using ebooks? [gift? recommendation from friend? heard about the functionality?]

   ii. What do you use your ebooks for? [Leisure, study, special interests...]

   iii. What advantages did you expect from ebooks when you first started using them, as compared to other ways of reading? Have they delivered these advantages? Why/why not?

iv. How do you read your ebooks? [dedicated device? Software?]

1. If a dedicated ebook reader: Which model(s)? [Do not prompt, but make a note of the brand(s), eg Kindle, Sony Reader, BeBook ,eGriver,]
2. If software (plus a computer or smartphone): What software do you use to access ebooks? [Note model and software type, eg PC/Mac + JAWS + Stanza, iPhone/iPad + VoiceOver + iBooks]. If not, have you heard of any combinations of computer/smartphone and software in order to read ebooks that you do not use? [Note these].

v. How do you access ebooks content? [Large print/ enlarged text on screen; synthetic speech/screen reader; tactile/ Braille, ...] How accessible do you find reading in these formats on these readers?

vi. Where do you get your ebooks from? How accessible is getting the ebook you want [eg, finding the book you want, downloading it to computer, transferring it to your reader]?

vii. Dependent on what respondent reports having used, for those not mentioned: Have you heard about [dedicated ebook readers/ ebooks software]?

b. ebook perceptions specific to each ebook reader that is used...

I'd now like to ask you some specific questions about the way(s) in which you read ebooks. You mentioned that you use [insert reader(s) here; if participant indicates more than three types of reader, ask which three they use the most]:

i. How do you access ebooks content? [Large print/ enlarged text on screen; synthetic speech/screen reader; tactile/ Braille, ...] Do you use any additional software with this reader?

ii. Is the reader portable, or fixed? If portable, do you take out and about with you? If no, why not?

iii. What do you find accessible or inaccessible about the reader?

iv. [If they use different readers, but only commented on one process in a.vi, above, ask:] What do you find accessible or inaccessible about transferring ebooks to your ebook reader?

v. How often do you use it? Where do you use it?

vi. How easy is it to use? What are its best and worst features? Why is that? How would you improve it?

vii. How did you first hear about it? How long ago, and from whom?

viii. What did you hear about it at first? Did you do any research on it yourself? What information did you need to know before deciding whether or not it would be useful to you? And which of those were the most important factors in your decision to get it?

c. ebook perceptions specific to each ebook reader that is not used

So those questions were regarding your experience with [insert ebook reader(s) here]. Have you considered using any other ebook reader? [Note other main ebook readers that were considered and ask the following.]

i. What did you hear about it at first? Have you done any research on it yourself? What information did you need to know before deciding whether or not it would be useful to you? And which of those were the most important factors in your decision to not get it?

ii. What put you off getting that reader? [If financial, probe with 'if money were no object, would anything else stop you from using it?' eg, awareness, availability, product associations, portability, functionality, usability, need...]

iii. What would make you reconsider getting that ebook reader?

d. ebook perceptions specific to each type of reader that is not used...

So those questions were regarding your experience with [insert ebook reader(s) here]. Have you considered using any other ways of accessing ebooks? [If answered about dedicated device so far, and have not mentioned software, ask questions below about ebooks software. If answered about ebooks software so far, ask questions below about ebooks device.]

Aside from this interview, have you heard about [ebooks devices/ebooks software]? How did you first hear about it? If yes, how long ago, and from whom?

i. What did you hear about it at first? Have you done any research on it yourself? What information did you need to know before deciding whether or not it would be useful to you? And which of those were the most important factors in your decision to not get it?

ii. What put you off getting that type of reader? [If financial, probe with 'if money were no object, would anything else stop you from using it?' eg, awareness, availability, product associations, portability, functionality, usability, need...]

iii. What would make you reconsider getting that type of ebooks solution?

6. For participants in the NON-USER group

a. General ebook experience...

I'd like to ask you about your perceptions of ebooks and ebook readers.

i. What advantages and disadvantages for blind/partially sighted people would you expect from ebooks as compared with other ways of reading?

ii. Have you ever considered trying an ebooks device/ ebooks software (ask both to non-users) If not, why not? [If financial, probe with 'if money was no object, would anything else stop you from using it?' eg, awareness, availability, product associations, portability, functionality, usability, need, need to use a

computer, website etc., PC and web accessibility...]

b. ebook perceptions specific to each platform...

As I mentioned previously, there are different ways to read ebooks. These include using dedicated ebook readers like the Amazon Kindle or Sony Reader, as well as software that you can use on a computer or smartphone, such as iBooks for the iPhone or iPad, or Stanza for PC. I'd like to ask you about each of these two types of ebook reader specifically. [Repeat questions i – iv for each of the two types.]

i. Aside from this interview, have you heard about [ebooks devices/ebooks software]? How did you first hear about it? If yes, how long ago, and from whom?

ii. What particular brands/ebook readers did you hear about? [eg. for devices, could be Sony Reader, Amazon Kindle; for software it could be iBooks, Adobe Digital Editions for PC]

iii. What did you hear about it at first? Have you done any research on it yourself? What information did you need to know before deciding whether or not it would be useful to you? And which of those were the most important factors in your decision to not get it?

iv. What put you off getting that type of reader? [If financial, probe with 'if money were no object, would anything else stop you from using it? eg, awareness, availability, product associations, portability, functionality, personal need...]

v. What would make you reconsider getting that type of reader?

7. All participants – Wish list

Now I'd like to ask you some questions about how technology could better support your reading experience.

a. How do you think the technology currently available could support you in reading books more easily and naturally? How could it support you in reading a wider variety of books?

b. What things do you/would you look for in the perfect ebook reader? How would you check that it can offer you these things?

c. What are the minimum functions or qualities (eg size, flexibility, portability, battery life) that an ebook reader would need in order for you to consider getting it? What desirable, but not essential, functions would it need?

d. If you used an ebook reader, would you want one that was dedicated just to ebooks, or would you prefer a gadget that allowed you to read ebooks as well as do other tasks? Why is that?

8. Closing

Do you have any other comments on your experience or thoughts on ebooks that we have not discussed?

That's the end of the interview. I'm going to turn off the recorder now. Thank you very much for your time and participation. Your comments have been very helpful.

As I mentioned at the start of the interview, RNIB may wish to contact you again in the future in order to see whether your thoughts on the issues we have discussed have changed or stayed the same. May RNIB contact you on this telephone number again? Is there a better/alternative method of contact that we can also keep on record [eg email address]?

Thank you again for your time. Goodbye!

Appendix: examples of commercial ebook readers

1. Dedicated ebook readers

- Sony range, including Touch (PRS-600), Pocket (PRS-300)
- Amazon Kindle
- BeBook range, including Mini V5 and Neo
- Bookeen Cybook range, including Opus and Gen 3
- Cool-ER
- Elonex ebook range, including 511 EB, 600EB
- Hanlin V3
- iRiver Story
- Foxit eSlick

2. ebook reading software

- Adobe Digital Editions on PC
- iBooks for iPhone, iPad, iPod Touch
- Amazon Kindle for iPhone, iPad, iPod Touch, Android, Blackberry, PC or Mac
- Stanza for PC, iPhone, iPad, iPod Touch

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