The Feasibility of E-Ink Readers in Distance Learning: A Field Study

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Abstract—E-book readers based on E-ink mimic paper very closely and are an emerging technology. Despite the slow acceptance of this novel technology, The Open University of the Netherlands (OU) is preparing to offer study material for this new medium. This paper reports the first experiences with the introduction of the new technology, both from a content producer's perspective as well as from a consumer's viewpoint. As it turned out, a significant amount of effort had to be spent on reformatting the already available A4 sized standard study material to accommodate the small 6'' screen sizes of today's E-ink readers. Our experience suggests that the classic A4 study material production process has to be replaced by a media-agnostic process, allowing for a flexible formatting and sizing of the content at the end of the process. In addition, since much of the content originates from external publishers, their "reformatting" capabilities have to be taken into account as well. To obtain firsthand experience from our students, the first 14 students who received an E-ink reader were subjected to a questionnaire. In general, the students responded positively to the new reading experience. The E-reader was most popular at home, but could also be used during travelling due to the small form factor, low weight and good battery longevity. The students were also positive about the legibility, but missed the possibility to take notes and underline sections of the texts. Despite all challenges, we expect that the E-ink technology is here to stay and as this technology matures, many of the problems identified will be solved.

Index Terms—E-book, E-book reader, E-ink, E-ink reader, distance learning

I. INTRODUCTION

Specialist E-book readers, and devices such as notebooks and PDA's that can be used as E-book readers, are readily available these days. Also, a sizeable amount of content is offered by a number of suppliers. An e-book, (electronic book), provides the content of a book in an electronic form. An e-book can be viewed on a computer or in a device especially designed for reading e-books. Such devices tend to be a tablet type or a hand held device (PDA).However, acceptance and usability of E-book readers has been limited so far. While many people still prefer to flip paper pages, e-books do have advantages (e.g. portability) which will improve as technology improves. Traditional book sales clearly dominate the reading market. Gall [2] summarizes a few causes for the lack of success of E-books so far:

- the relative high prize of both E-book readers as well as content,
- the lack of interest from major publishers,
- E-books and traditional paper based publications are in a competition in which technologists tend to favor E-books and traditionalists prefer printed publications, etc.

In a recent market analysis, however, optimism still prevails. CNET [1] expects that sales of dedicated E-book readers will increase dramatically when the price drops to below $300.

It looks like E-book readers have had a slow start, but that still substantial confidence exists that this reading medium will become a success. It seems to be just a matter of time when this will happen.

Since the E-book reader technology is still fairly novel, little academic research is available assessing the feasibility of E-book technology in academic teaching, and in particular in a distance learning setting. Most publications are based on small scale experiments aimed at ergonomic and functional issues from an E-book user perspective. Marshal & Ruotolo [4] emphasize, amongst other issues, in their field study the portability, readability, quality and size of the display itself. They also note that students may access content in a non-linear way and want to make annotations. Thus, easy and speedy navigation facilities are important. In addition, the ability to make persistent annotations directly into the visual reading space is desirable. Other studies, such as Luff et all. [5] focus on ergonomics of the reading experience and point to the limitations of LCD technology in comparison with E-ink [6]. E-ink technology in general is regarded as an important breakthrough for E-book readers. E-Ink mimics the reading experience from regular printed paper closely and minimizes eye-strain, a major ergonomical problem [7] with other technologies. Recently, E-book readers incorporating E-ink or equivalent technology have appeared on the market as the latest novelty for reading devices.

At the time of this writing, most of these E-ink devices are very portable, equipped with 6 – 8 inch black and white only screens, have limited navigation controls, mostly limited connectivity (document transfer via USB) and limited text format support. On the other hand, some of these devices can easily stay in operation for over a week without recharging and can be used for hours even in bright conditions without eye fatigue. In general, these devices try to mimic the paper experience as much as possible, but neglect other functional aspects such as collaborative use of reading material (e.g. [8]), which has been a focal point in other studies exploring functional uses of E-book platforms such as PDA's.

The Open University of the Netherlands (OU) is confident that this novel E-Ink technology will mature and has high potential becoming the dominating medium for dis-

tribution and consumption of learning content. Already, a small number of courses are converted to suit E-book reader displays and more will follow soon (OU Press release, [3]). The OU recognizes today's immaturity of the E-book reader market and technology, but is determined to gain experience now by providing content to the students in an E-reader friendly format, in order to be ready when the technology has matured and market acceptance has been achieved.

At the OU it is believed that in particular the high reading quality will help to significantly increase market acceptance. In addition, the small form factor and the high storage capacity may appeal to many of our students. Many of them have busy jobs and need to make use of any little spare time available to pursue their study. Students study during lunch breaks, whilst commuting, on holiday, just before sleep, etc. In such situations, a portable high quality, high capacity reading device could be very valuable. In order to make preparations for delivery of E-reader content, it is essential to investigate whether it is possible to produce or convert material for E-readers and other future media easily, and how well our students respond to this new technology.

In this paper we will present our own firsthand experience with the application of dedicated E-ink based E-book readers[1] in a distance learning environment. At first, we will discuss the current status quo of E-ink readers to provide a suitable introduction to the challenges that lie ahead for a routine roll –out of E-ink readers. The first question that must be addressed is content production. E-ink readers may have varying screen sizes and accommodate only certain document standards. As we will demonstrate, publishing on an E-book reader is not a straightforward process if the entire organization and its external content suppliers are tuned to a fixed format based content production process. Yet a different potential problem is the acceptance of E-book readers and content with our students. All content production efforts are in vain if users do not adopt the new medium. Therefore, we will also discuss the setting of a field experiment to gain insight into the student's perspective. In a subsequent section we will present the findings viewed from this survey. Finally, we will draw our conclusions based on this field experiment and provide a discussion on the challenges that lie ahead.

II. A SYNOPSIS OF E-INK READERS

E-books cannot be immediately accessed, but require a special electronic device to view them, such as a computer, hand held device (PDA), or a e-book reader (e.g. E-ink reader).

E-books are not comparable to paper books in the physical dimensions and feel to which we have gotten very accustomed. The challenge for e-books is not just technical, but in as much psychological. Some e-book formats are getting closer to challenging the traditional concept of a book but we are not quite there.

Not all e-books have intuitive highlighting, note taking, and bookmarking although most do and are improving.

Not all e-book reading devices have "clear type" or other readability enhancing technology. Unlike PDA's or small form factor notebooks such as the ASUS EE-PC or the OLPC, E-ink readers are dedicated to reading documents comfortably and offer a pleasant reading experience for prolonged times and in bright lighting conditions, far superior to reading on a PDA. Unlike with many PDA's and netbooks, support for other functions such as communication, computation and audio are implemented only half heartily in dedicated E-ink readers. PDA's and similar devices were not designed specifically for e-book reading but perform well with the appropriate software installed in them. Microsoft Reader, Adobe Reader, and Mobipocket are some of the software that run in these devices. The new E-ink hardware makes use of Phillips and E-Ink technology. Screens are thin, are very energy efficient (long use between recharges), and are very readable due to E-Ink. The E-Ink technology simulates the texture of a printed page on the flexible screen. These combined improvements are part of the long awaited breakthrough. In addition, Amazon has added some special functionality to their e-book called the Kindle. In general, E-ink readers provide ample storage for e-books and other reading material. E.g. All reading material for an entire curriculum would easily fit on a modern SD card or internal memory.

At best, communication facilitates wireless transfer of documents through Wi-Fi. Other devices rely on USB ports and SD card slots for data transfer. The Amazon Kindle is the exception in this field with a proprietary "purchase-and-download" interface of content through EVDO, which is only available in the USA. However, more advanced types of communication such as peer to peer are just getting introduced. Because the devices use embedded firmware, user installed software is only an option for technical advanced individuals and perhaps not practical anyway due to the limited processing power and memory restrictions. Some devices have an MP3 player that can be used in parallel to reading a document, but genuine multitasking is not available.

Currently, most E-ink readers offer a plethora of formats that can be used to render documents. Most claim support for Mobipocket, doc, txt, rtf, pdf, and sometimes more exotic ones such as Djvu, FB2 and WOLF (see also [9]).

Navigation and searching through loaded documents can be cumbersome if no adequate interfaces are provided. E.g. the Cybook and the Hanlin V3 have only a limited number of navigation buttons. Searching for specific parts of text requires frequent button clicks or is simply not possible. E.g. the Hanlin V3 can only navigate through preset document indexes and a few user set bookmarks in pdf formatted documents, and entirely lacks free text search capability. The iRex on the other hand, does allow relative convenient full text search through a pen tablet interface.

Several pages can be filled discussing the few commonalities and the many differences between current E-ink readers. The bottom line however is that, in general, these devices are designed for sequential reading and concentrate on mimicking the paper-reading experience.

III. CREATING CONTENT FOR E-INK E-BOOKS

A. The Fixed Format "Curse"

The OU like most universities and organizations is still very much paper-based. The OU produces all learning content in A4 format with a well established standardized

[1] The OU chose the Hanlin V3 (and the identical LBook) offered by Jinke Electronics as the standard for the experiment.

three-column style. An internet learning environment exists, through which all kinds of content is offered to the students. Still, even in that environment text-based content is largely formatted in A4.

The biggest problem with traditional fixed formats, such as A4, is that content doesn't scale well on the small screens of E-books. Typically, users are required to zoom in on an E-reader, if that option is available, to achieve clearly legible texts. As a result of zooming, the number of "move-page-forward-button-presses" increases substantially. In addition, figures, and in particular multi-column layouts, become distorted and in extreme cases, cannot be displayed at all. The use of different and complicated fonts also may cause readability issues. Most E-book readers have a rather limited set of fonts. If fonts are not embedded in a document, some text may not be rendered correctly, or not at all on an E-book.

At the OU, the internal content production process is geared for A4 sized paper documents only. Authors of content usually use a word-processing package like Microsoft Word to create documents digitally on regular Windows PC's. Then, editors use these word-processing files for proof reading, spell checks, etc. If the author approves the corrections, the visual formatting process starts. A document is transferred to special type setting and publishing file formats and is no longer available for content editing. At this stage, the final format is set to the standardized A4, three column layout, typical for all OU printed materials. The final product of the content production process is saved in a special type-set ready format. This type-set format can only be used practically for printing purposes. Editing, reformatting, preparation for other media is not possible in an easy way. Much of our material is only available in a type-set format and the original editable sources are not routinely stored. Much depends on editors and authors who may, or may not, have preserved a copy of the original work.

B. External Sources

Yet another challenge is the use of text material originating from outside sources, such as individual (freelance authors), publishers of books and Journals. Again, the problem is rigid formatting. In particular, publishers provide material in Adobe pdf standard format, sometimes in A4, sometimes in Letter format, depending on the original paper medium of publication. Whereas, individual external authors can be persuaded to provide their texts in editable word-processing standards, such as Microsoft Word, publishers are in a different league. We interviewed several big international publishers, about their intentions to provide content more suitable for smaller E-reader display sizes, or at least, if they could provide the material in an editable format. None of them could comply with our requests in a straightforward way. All affirmed, they have plans to enter the E-reader content market, but no solid time frames were given. Typically, if E-reader material is offered by publishers, the original printed format is used as a basis to render a pdf encoded file. No special processing is done to accommodate smaller screen formats. Some publishers confirmed that reformatting for E-readers is possible on request, but at extra cost. In that case, digital content would be more expensive than traditional printed material, which is difficult to justify to our students.

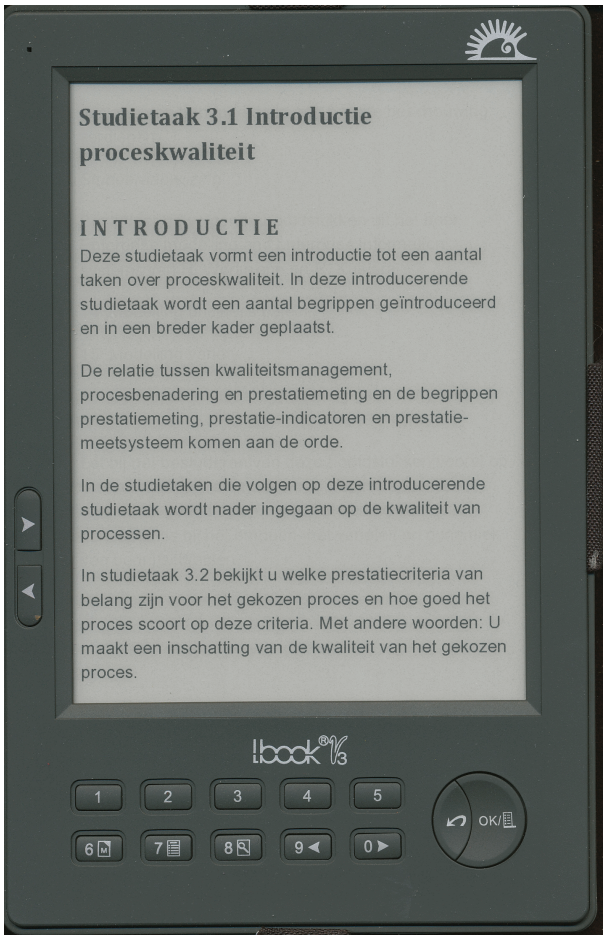

Figure 1. Some sample text on the Hanlin V3

C. Content Reformatting

It is clear that in order to offer suitable content for E-readers, additional processing is required. During the initial stages of the project we encountered several practical issues, which make a format conversion quite a daunting and laborious task.

In order to have full control over the layout, we decided to use the pdf format. Other free form converters such Mobipocket, WOLF, etc. offer much less control over the final layout and seem to be useful for quick occasional conversions and not for quality layouts. Although, the pdf format is a rigid format, we managed by experimentation a setting of font, font size and margins accommodating well legible text for E-readers with screen sizes ranging from 6 to 8 inch (see figure 1).

Depending on the type of pdf document we used as input for our conversion process, conversion time varied widely. Microsoft word documents were converted with Adobe Acrobat using just a few tweaks. Typically, 200 pages of text can be converted manually in about one hour. The most extreme situation on the other end of the spectrum is a scanned page, formatted in pdf as a source document. In that situation a physical print and OCR software was needed to completely rebuild each individual page from scratch. Even persons with a lot of routine needed on average one hour to rebuild 11 pages.

Clearly, such manual conversion jobs are not very inspiring and motivating, to say the least. In case external material is converted, legal issues must be addressed as

well. In addition, the costs of manual conversion can be prohibitive and justifiable only in an experimental situation.

IV. A SURVEY AMONGST FIRST TIME USERS

A. The Setup

An important part of our experiment was to gather first hand information on how our students would respond to the introduction of this new medium. We developed a short questionnaire focusing on usability, the actual usage pattern and the impact on study behavior. We invited the first 14 students to answer our questionnaire. All students received the Hanlin V3 E-book reader, preloaded with specially re-formatted course material to maximize the reading experience. These 14 students were the first who responded to a special time-limited offer of the OU in which a free E-reader was offered along with a course module. The students said they had no previous experience with media like our E-book reader before, nor that they had any special technical background that could possibly ease their ability to operate the E-reader. Therefore, we can assume that they are true first time users. However, because the E-book reader was advertised as a special bonus, we must assume that the fresh students would at least show some interest and posses a somewhat elevated level of curiosity compared with our typical student about this medium.

Furthermore, the students only received a printed copy of the operating instructions provided by the manufacturer. OU Staff installed the latest firmware and copied the course material on the SD-disk before shipping the E-book reader to the student together with the traditional paper printed version of the course material. Technical and operational support was provided by the Dutch supplier of the E-reader. They reported no service calls during the testing period. All students of the sample were informed at the beginning that they will receive a questionnaire, but they didn't know the questions beforehand.

Roughly three weeks after shipping the material, the students received our questionnaire. 13 students have filled in the questionnaire completely.

The questionnaire contained 64 questions on general usability, actual usage, study experience, functional features, possible improvements and the potential to raise the OU's profile as an innovator in the educational market.

B. The Findings

Since our sample consists of only 13 respondents any significant statistical analysis to discover meaningful relationships between variables would not result in significant conclusions, and therefore no attempt has been made to venture into any statistical analysis. However, still some interesting observations can be made, in particular if the written free comments are interpreted. In the main section of this paper we will concentrate on the, in our opinion, most interesting findings. However, all responses of the questionnaire are shown in the appendix.

1) E-Reader Usage

Just one respondent had not used the E-book reader at all during the first three weeks. The others have used the reader for at least 10 hours (6 students). The majority used the reader to study the course material only (10 students), whilst a few others used it for some occasional reading of private material. 8 students relied mostly on the traditional paper based material, and apparently, only used the reader occasionally. Interestingly, home is still the favorite location of reading the E-content (8 students), but the reader has been used in many other places, but not as often.

None of the respondents have used the MP3 player functionality, which may be not surprising, since no MP3-files were pre-installed.

2) Usability

All but one respondent find the reader useful to various degrees and find the material easily accessible (7 are positive about the usability). No respondent was negative about the legibility of the text on the reader (1 student was neutral).

3) Study behavior

The majority of respondents say that traditional paper material is (still) better suited for studying (6 students). The availability of a reader as a tool for study causes mixed feelings. Half of the respondents believe that a reader could stimulate studying; the other half doesn't or does not know. The same division exists in responses on the statement that a reader would provide more opportunities to study (6 students agree with this statement). Quite a few respondents don't know whether the availability of a reader would improve their study behavior (4 students).

When asked about the two most important advantages of an E-book reader the following items appear (Fig. 2).

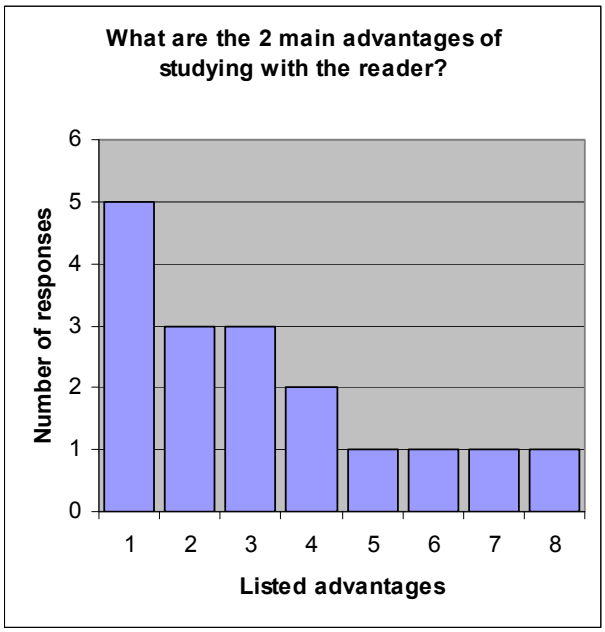

Figure 2. The perceived advantages of studying with the E-book reader.

Legend:
1 = Convenient compact size
2 = Easier to take along
3 = Easy access to study material
4 = Studying any place
5 = Ease of use
6 = Accessibility files
7 = Ease of adding supporting study material
8 = Ease of use of text index

The least desirable characteristics can be summarized in Fig. 3.

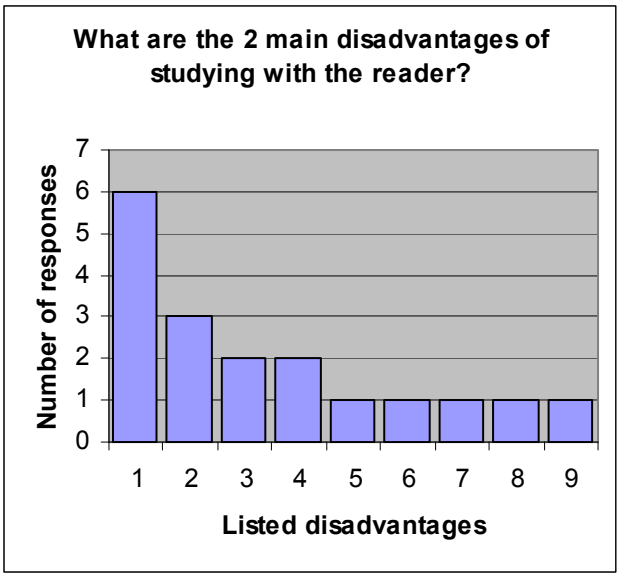

Figure 3. The perceived main disadvantage of studying with the E-book reader.

Legend:
1 = No underlining/highlighting possible
2 = Not possible to make notes
3 = Not easy to turn pages in the text quickly
4 = Contents index unclear
5 = Not easy to put material on it
6 = Used to paper
7 = Full text search not possible
8 = No color
9 = Course not available in a single file

4) Other Findings

In all, most respondents were pleased to have the E-book reader, but consider a commercial price of €350,- at the time of this writing as too high. Interestingly, the majority of respondents (10 students) is satisfied with the 6 inch display format and besides the handy format, they were pleased with its readability and portability (5 and 4 students respectively). The ability to take notes was the most missed feature (9 students). In general, some respondents criticize the quality of imported reading material that hasn't been reformatted properly for the small display size. The magnification function on the E-book reader is considered inadequate in general.

V. CONCLUSIONS

For some time people have predicted that e-books would take over from their paper counterparts, yet, the change has not happened. Some blame the technology that in the past did not provide enough readability but the issue seems to be more cultural and generational than technical. Younger people are more comfortable with the devices and reading from screens while older individuals prefer paper even when the features of the e-book mimic every aspect of the paper books (bookmarks, note taking, highlighting, etc.)

While years ago they had predicted that by now we would all using e-books, it is clear now that paper books will be around for a long time to come, yet, that does not mean the e-book market will not grow. On the contrary, it is and will expand as customers get more used to the format. Some indication of this is seen in the large book retailers offering "peeks" of the e-book format before you buy the paper product. In some cases they also provide you with access to the e-book so you can start reading it right away even before the paper book gets delivered to you. As more customers use this format they might slowly start moving towards e-books and away from paper.

E-Ink technology, flexible screens, and improved readability will help make e-books much more attractive in the near future. Yet a concern remains that the technology now being developed has the goal of making the e-books look and feel as paper-like as possible. Yet, the new generation is not attracted to the paper media as much as they are to electronic and interactive media. Perhaps the current trend to use high tech to imitate the long lived paper book is indeed an important but generational phenomenon.

The discussion in this paper shows that E-ink technology for E-book readers is a promising technology that may very well change our reading habits in the near future. As for any new technology, still some improvements are necessary to make E-ink E-readers a success.

First of all, the readers themselves are still rather expensive and they are not available in large quantities on the market. Secondly, their feature set is quite limited and the firmware is buggy in all E-readers we have tested ourselves. Although the manufacturers publish firmware every now and then, true advancements come at a slow pace.

Thirdly, looking at the content production side, it is quite challenging to convert media rich A4 paper based content to different screen dimensions and resolutions of current readers. During conversion trade-offs must be made between richness of formatting annex presentation of content and legibility. Depending on how the original content is defined and stored, a more or less elaborate conversion process is required to produce adequate E-reader content.

The limited user survey revealed that the current generation of E-readers doesn't replace full size printed paper material. The E-readers are appreciated most for their high storage volume, combined with a small form factor, which makes them a very good travelling companion.

Being able to make notes seems to be the feature that is missed most in our currently selected E-reader, i.e. the Hanlin V3. The E-book is valued in general as a useful accessory to the traditional paper based material.

At the time of this writing, E-readers with larger, near A4, sized screens are slowly appearing on the market. These larger screens would largely alleviate the conversion problem, but may inhibit the portability aspect. Since, portability is very important to our students, rigid A4 sized tablet-like E-readers may be regarded as inconvenient. On the other hand, flexible or foldable E-reader screens may be an excellent solution to both challenges, technology permitting.

The introduction of E-book readers on a routine basis is not trivial and requires a thorough redesign of the content production process with the internal and external content providers. Currently, too much effort is needed to convert existing material. In addition, future technological advancements and changing requirements from an educational point of view may favor a multitude of different media, each requiring their own type of formatting. Instead of presenting content in written form, it is conceivable to produce spoken text and show videos. A flexible,

and above all, as media-independent as possible, format is needed in which content can be assembled, revised, stored and processed into different media, all based on the same source.

A large part of the format problem is related to the use of content provided by different publishers, who may, or may not have their own policies regarding the support of E-ink readers. The OU, like other universities relies very much on content from external publishers. Further investigation is needed to interface with their formatting standards and workflows.

E-books have come a long way and many are available today as can be evidenced via a simple web search, yet, e-books have suffered from the format wars and the psychological attachment we have with the printed page.

As users realize the benefits of portability and that e-books will bring features not available in traditional books, the momentum will shift.

Another influencing factor will be users' realization that they don't need to have special devices to read e-books and that the enhancements, such as "Clear Type", make e-books much more appealing to the eye. In the meantime you can expect the shake up of the e-book industry to continue, especially for those with proprietary formats.

Some encouraging news comes from companies such as Everybook Inc and E-Ink. Everybook Inc has been doing studies about how people read books and are trying to develop devices to match. Some of the devices have two pages (LCD panels) to mimic the traditional book. Others, rather than building hardware to mimic the traditional book are trying to do the same with software. An example is www.ebookstarter.com. E-Ink, on the other hand has been working on readability issues and now has a vastly improved system that gives the reader the feel of paper-like texture for the e-book. Let's hope this exciting new technology matures.

E-books have a long way to go but they have certainly done well so far. E-book designers have striven to make the reader emulate the paper reading experience. The paper book has thrived for a long time and has a very loyal following The first generation of E-Ink displays worked well with static text and images, but lacked a fast screen refresh meaning good quality animation wasn't possible.

It is said that true innovation comes only with a complete paradigm shift. E-ink is not a complete shift but both portable e-book readers and electronic ink/paper are a great start.

As a result progress may be slower in this direction. Electronic ink is a product that may start out in the book emulation game, but could be a stepping-stone to better products. E-ink could come from the back of the pack in the race to win over readers and paper lovers, and lead us into a truly paperless world. As it turned out, a significant amount of effort had to be spent on reformatting the already available A4 sized standard study material to accommodate the small 6 inch screen sizes of today s E-ink readers.

It is clear that a couple of big challenges must be overcome in the short term. But as E-ink technology matures and content producers such as the Open University and publishers agree on E-book standards, E-ink E-books can demonstrate their true potential.

For the reader, content can be used in multiple media, visually, as text, or auditory, as spoken words. Large amounts of content can be stored together on a small device, accessed effectively anywhere any time, surpassing the possibilities and conveniences of plain paper. For a content producer such as the OU, significant savings can be achieved as expensive physical printing processes, requiring specialized logistics with associated stock risks may no longer be required at some stage[2]. Despite its technical and organizational challenges reported here, we still believe that investing into E-ink technology now, is well worth it.

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APPENDIX

Did you use the e-book reader (closed question)?

Yes	10
No	1

[2] Unless printing on demand is introduced.

1. The e-book reader is user friendly.
2. The course material on the e-book reader is well legible.
3. The course material on the e-book reader is well accessible.
4. Course material not yet on the e-book reader can easily be transferred to the reader.
5. A specific Open University helpdesk for the e-book reader is not necessary.
6. Study material is better absorbed through the reader than through printed material.
7. The reader offers the possibility to study more often than the printed material.
8. The availability of the reader stimulates studying.
9. Use of the reader improves studying.
10. The completeness of the kit (cover, charger, headset et cetera) of the device itself is satisfactory.
11. The price/performance ratio of the reader (shop 380 Euros) is acceptable.
12. I would like to listen to spoken course materials on the reader through the mp3 player on the reader.
13. I would like to acquire more course material suitable for a reader.
14. I don't need printed material, the pre-formatted material for the reader is sufficient to satisfy my requirements for study.

(closed questions)

Q#	L1	L2	L3	L4	L5
1.	0	1	2	6	1
2.	0	0	1	7	2
3.	0	1	2	6	1
4.	0	0	6	3	1
5.	0	0	5	3	2
6.	2	4	3	1	0
7.	1	2	2	5	0
8.	1	2	2	5	0
9.	1	3	4	2	0
10.	0	2	0	7	1
11.	2	1	5	2	0
12.	2	3	3	2	0
13.	0	2	2	6	0
14.	6	2	0	1	1

Legend:
L1 = Completely disagree
L2 = Disagree
L3 = Neutral
L4 = Agree
L5 = Completely agree

15. Which percentage of the total usage of the e-book reader was dedicated to reading the issued course material?
16. Which percentage of all study hours for the issued course did you use study material on paper?
17. Which percentage of all study hours for the course did you use the Open University's own electronic learning environment?
18. Which percentage of all study hours did you use the reader to study other OU material?
19. Which percentage of all usage hours did you use the reader for your job?
20. Which percentage of all usage hours did you use the reader privately?

(closed questions)

Q#	P1	P2	P3	P4	P5	P6	P7	P8	P9
15.	4	2	0	1	0	0	1	0	2
16.	1	0	0	0	1	0	3	3	2
17.	8	0	0	0	0	0	1	0	1
18.	0	0	0	0	0	0	0	0	0
19.	0	0	0	0	0	0	0	0	0
20.	0	2	0	1	0	0	0	0	0

Legend:
P1 = 0 - 10 %
P2 = 10 - 20 %
P3 = 20 - 40 %
P4 = 40 - 50 %
P5 = 50 - 60 %
P6 = 60 - 70 %
P7 = 70 - 80 %
P8 = 80 - 90 %
P9 = 90 - 100 %

How many hours in total do you estimate for using the e-book reader (as well for Open University courses, other courses, work and private) (closed question)?

Hours	# respondents
1-10	6
10-20	2
20-30	1
30-40	1
40-50	0
50-75	0
75-100	0
100-150	0
150 or more	0

For what purpose did you use the e-book reader (closed question)?

Purpose	# responses
the course material issued in this special offer	10
Other Open University courses	0
Work	0
Privat (relaxation, hobby et cetera)	3

In which locations did you use the reader for studying the issued material (closed question)?

Place	# responses
At home	8
Train	3
Bus	1
Car	1
At work	1
Other	holidays, camp site, second home, etc.

In which place did you use the reader for studying for the issued material study the most (closed question)?

Place	# responses
At home	9
Train	1
Bus	0
Car	0
At work	0
Other	none

Other remarks on studying with the reader (open question, answers literally translated from Dutch into English):

- The reader is clumsy at this moment for reading large texts, because it lacks the possibility for taking notes and underlining texts. Usage is absolutely easy, because it is easy to take the reader along and paper is not necessary.
- Easy to take along study material, but restricted in retrieving desired parts of the text quickly, opening more documents at the same time and making notes.
- Great support of the study
- Great usefulness, but facility for taking notes is desirable.

The format of the reader is (closed question)

Format	# respondents
much too small	0
somewhat small	0
all right	10
somewhat too large	0
much too large	0

The reader should have the following enhancements/extensions (closed question, several answers possible):

Enhancement/extension	# responses
7 inch screen (slightly bigger then present 6 inch screen)	1
10 inch screen (almost A4 format)	1
Colour screen	4
More shades of grey	2
Bigger battery capacity	0
Take electronic notes	9
Quicker response	2
Wireless data transfer using wifi	2
Wireless data transfer using Bluetooth	2
Bigger SD memory card (now 1 Gb)	2
Play video	2
Internet ability (browser. E-mail)	4
Other	touch screen

The next 2 properties of the device I appreciate most (open question):

Property	# responses
Size, compact, light	5
Readability	4
Easy to take along	2
Ease of use	1
Save paper	1
It's digital	1
Battery performance (long)	1

The next 2 properties of the device are most annoying (open question):

Property	# responses
No underlining	2
Sometimes speed of operation	1
Leaf back	1
Manual	1
Table of contents	1
Changing documents	1
Not all pdf-files be shown legible on screen	1
Operation through keys is slow	1
No notes possible	1
Slow response screen	1

I have the next general remarks on the reader itself (open question, answers literally translated from Dutch into English):

- Suitable for reading books approximately with the same size of the screen. It shows that the original text of the study material is developed for A4 format, because the material is sometimes shown clumsy.
- A manual would be handy explaining how to get documents in a readable form on the reader. Standard PDF documents are shown that small that even a magnifying glass is not sufficient to read them clearly.
- It would be easier if it had a screen with keys.

Please note here your remarks which didn't already came up in the previous questions (open question, answers literally translated from Dutch into English).

- It is easy to carry the reader in your book-case.However, I am missing the ability to make, to exchange data with other devices and convenient access of remarks/notes when using this study material.
- Once again, great support of the training. Everything digital in the same book in the right order would probably be nicer.
- The reader is a 'nice to have' i-pod concept, but not practical for the course. I like to underline and make notes into books. This is not possible with this reader. Therefore I did not use it for this course.