On the Design Preferences for Ebooks

Pei Fen Chong, Yan Peng Lim[1] and Siew Woei Ling[1]

Faculty of Information Technology, Multimedia University, Cyberjaya, Malaysia.
[1]Faculty of Creative Multimedia, Multimedia University, Cyberjaya, Malaysia.

Abstract

While many academic libraries are increasingly providing ebook services, a barrier to the adoption of ebooks, however, is their unsatisfactory design. This paper reports on a study that investigates the students' preferences for the ebook designs, in an attempt to review what appeals to them in an ideal ebook. Comparison was made between three ebooks in portable document format, all of which were nonfiction, but differed in contents and their styles of presentation. Based on the preliminary findings, some general guidelines were suggested for the improved design of ebooks.

Keywords

Content design, Design guidelines, Design preferences, Ebooks, Navigation design, Page layout.

1. Introduction

Ebooks are gaining in popularity and significance among libraries [1], and many higher education institutions around the world have provided ebook collections in their campus libraries and adopted ebooks as learning materials. The University of Auckland is one of such universities, which integrates ebooks into teaching and learning [2]. The total spending on the ebooks had increased from 3% of the total collections budget in 2004 to 8.5% of the total collections budget in 2007, and over 300000 ebooks were accessible via the library catalogue in 2008 [2]. The University of Phoenix has also shifted almost completely to ebooks [1].

In Malaysia, many libraries are in the transition from the printed collection to a blended collection of printed and digital resources [3]. The Multimedia University (MMU) launched the first academic university digital library in the nation, the Siti Hasmah Digital Library, in July 2000 in the university's Cyberjaya campus [4]. Open University Malaysia (OUM) has also provided a digital collection in addition to more than 8500 volumes of books in its main campus and learning centres nationwide. The university's digital library provides access to more than 40000 titles in ebooks and 18000 titles in ejournals respectively [5].

Besides MMU and OUM, a number of the public and private higher learning institutions in Malaysia, such as Universiti Utara Malaysia, International Islamic University Malaysia, Universiti Teknologi Malaysia, Universiti Malaysia Sabah, Universiti Sains Malaysia, Universiti Tenaga Malaysia, and Monash University also offer ebook services in their campus libraries. The wave of ebook adoption is expected to first hit higher education over the next two years, despite the fact that the ebook sales lag far behind the projections [1].

1.1 Ebook Design Concerns and Issues

Regardless of the higher institutions' efforts to incorporate ebook collections in their campus libraries, studies have demonstrated that the difficulty in browsing and reading an ebook and less user friendly interfaces are among the unfavourable aspects, which hinder the usage of ebooks [6-9]. On the other hand, Chowdhury [10] pointed out that interface design, which encompasses "what appears on the users' screen, how they view it, and how they manipulate it", has a tremendous impact on usability. In connection with this, results of studies have confirmed that adherence to the paper book metaphor increases users' subjective satisfaction and overall usability of the ebooks, as users' expectations from ebooks are inherited from their experience with paper books [11,12].

Nonetheless, Rowhani and Sedig [13] claimed that ebooks should not adhere to the paper book metaphor strictly, instead they should take more advantage of the interactive power offered by computational technologies. For instance, text rich educational ebooks can be enhanced by adding to them dynamic, interactive visuals. Findings of a study into the usability of e-encyclopaedias have also indicated that interaction and added value content, such as hyperlinked cross-references and multimedia, had a positive effect on sense of engagement, memorability, and likeability among the students [14]. Thus, a balance between adherence to the paper book metaphor and integration of the interactive power of computers is necessary to allow for a better appreciation of ebooks.

Furthermore, Parker [15] pointed out that the value of a publication is judged by its appearance long before it is read. Likewise, studies conducted by the Electronic Books ONscreen Interface (EBONI) project have signified that "the structure and appearance of paper books

are at the forefront of readers' minds when negotiating electronic texts" [16]. Concentrating on the appearance, rather than focusing on the technology itself, can improve the quality of the publications [11]. In addition, EBONI's studies have suggested that the students' learning ability is significantly affected by the arrangement of textual and other elements on screen, and this is heavily remarked by students who expect typographical sophistication [16]. Several students also commented that it is difficult to read text against white backgrounds due to the glare from the computer screen [16].

It is apparent that the ebook design is among the decisive factors which contribute to the users' satisfaction and plays a crucial part in the success of ebooks [15]. Hence, exploration and investigation into issues pertaining to the presentation, appearance, navigation, and accessibility of electronic content is essential [17].

1.2 Ebook Design and Usability Guidelines

The EBONI project, a 20-month project funded under the JISC DNER Program for Learning and Teaching [18], proposed the EBONI electronic textbook design guidelines after extensive evaluations of ebooks that involved approximately 100 students, lecturers, and researchers from various disciplines in the UK. The set of guidelines addresses two core aspects of ebook interface, namely the onscreen appearance of information, and the look and feel of ebook hardware [19].

There are seventeen onscreen design guidelines encompassing the two main themes: "The legacy of the paper book metaphor, and the wisdom of adhering to this, where appropriate, in the construction of the electronic book" and "the different set of requirements arising when the reader interacts with the new medium; in particular, the effectiveness of presenting material electronically in short, scannable chunks rather than a long, linear flow of text" [16], which emerged as fundamental to usability.

Besides onscreen design guidelines, EBONI electronic textbook design guidelines have also set out five hardware design guidelines, which are "employ high quality display technology", "balance lightness and portability against legibility", "design devices for comfort", "use buttons and dials to improve page turning", and "make devices robust", based on the feedback obtained from the study on the usability of portable devices.

Apart from the ebook design guidelines, there are several usability guidelines, which could be applicable to the design of ebooks. One of these guidelines is Nielsen's designing Web usability: the practice of simplicity [20]. Two usability factors, namely the page design and the content design are addressed. Nielsen [20] pointed out

that simplicity should be the goal of page design, as most of the time users prefer to focus on the content rather than enjoy the design. Screen real estate, crossplatform design, and linking are three important factors that affect the quality of page design. Content design on the other hand, comprises writing for the Web, legibility, and multimedia. It focuses on how to produce quality content.

Even though the guidelines are rather dated, usability guidelines remain extremely consistent across decades and a remarkable 80% of the guidelines from the 1990s still hold true today [21].

2. Method

2.1 Purpose of the Study

This exploratory study involved three nonfiction ebooks in the portable document format (pdf), all of which differed in contents, layout, and appearance. The purpose was to investigate the students' preferences on the page and content design of the ebook, in terms of navigation design, page layout, and content design. The results of this study had been reported by Chong, Lim, and Ling [22]. However, the focus of this paper is on recommending some guidelines that suit the students' preferences, based on the preliminary findings.

2.2 Participants

The participants are undergraduate students and postgraduate students from various faculties in MMU. These students are presumed to be computer literate and familiar with online learning systems, as the university has been seen to highly engage the students in an online learning environment, via the implementations of Multimedia Leaning System (MMLS), Integrated Computerized Education Management System (ICEMS), online bulletin board, online knowledge bank, and more, as found on the Online Applications website [23].

2.3 Materials

The three ebooks that were used for the evaluation will be described in this section. However, the titles of the ebooks will be concealed, instead represented by Book A, Book B, and Book C respectively, to avoid issues of sensitivity and reputation of the publishers.

2.3.1 Navigation Design

Book A and Book C provide page thumbnails, bookmarks, and table of contents to give an overview of contents and to ease navigation, whereas Book B provides page thumbnails, table of contents, index page, and glossary. Additionally, Book A provides crossreferencing between the table of contents and chapters and subchapters; Book C provides crossreferencing between the table of

contents and chapters; whereas Book B does not provide any crossreferencing between the pages. Orientation clues are also presented in the ebooks, where Book A provides ebook title, author, and page number on top of the pages; Book B provides page number, and alternate subchapter heading and ebook title at the bottom of the pages; whereas Book C provides only a dotted line to mark the end of each chapter.

2.3.2 *Page Layout*

The table of contents of Book A is presented on page two to page five; Book B on page four to page five; and Book C on page two itself. Chapter headings are listed in the table of contents of all three ebooks, however, Book A and Book B have page numbers added. The amount of information on the page is in the range of moderate to high for all three ebooks. There are also some figures that intersperse with body text in the ebooks. In addition, some tables and key notes in boxes also intersperse

with body text in Book B, and all the pages in Book C are framed.

2.3.3 *Content Design*

All three ebooks have dark colour texts on white background. Book A and Book C use Times New Roman font face, with different font sizes, styles and/or colours for the headings, body text, and emphasized text. Book B uses different font faces in different sizes and styles for the headings, body text, and emphasized text. The contents of Book A are presented in left aligned short paragraphs and indented bulleted and numbered lists. The contents of Book B are presented in two columns and fully justified text, with paragraphs and minimal use of numbered and bulleted lists. The contents of Book C are mainly presented in short left justified paragraphs.

The differences in page and content design among the three ebooks are summarized and presented in Table 1.

Table 1: Summarized comparisons of the ebook design

	Items	Book A	Book B	Book C
Navigation design	Orientation clues	Ebook title, author and page number on top of pages	Odd pages: Subchapter heading at bottom left, page number at bottom right; Even pages: Page number at bottom left, ebook title at bottom right	Dotted line to mark the end of the chapter
	Crossreferencing between table of contents and chapters	Links from table of contents to chapters and subchapters	Not available	Links from table of contents to chapters
	Navigation aids	Bookmarks and page thumbnails on the left panel; table of contents; associative links within the text	Page thumbnails on the left panel; table of contents	Bookmarks and page thumbnails on the left panel; table of contents
Page layout	Table of contents	Chapter and subchapter headings, and page number are listed	Chapter headings and page number are listed	Only chapter headings are listed
	Amount of information	Moderate	High	Moderate to high
	Arrangement of media	A few figures intersperse with body text	Figures, tables, and key notes in boxes intersperse with body text	Figures intersperse with body text in every chapter; framed pages
Content design	Chapter headings	16 point Times New Roman, bold, purple, initially capitalized	18 point ITCKabel, black, initially capitalized, center aligned	18 point Times New Roman, black, all caps, extended spacing between letters
	Subchapter headings	15 point Times New Roman, bold, maroon, initially capitalized	12 point Times New Roman, black, all caps, center aligned	Not available
	Body text	12 point Times New Roman, black	11 point Garamond, dark grey	12 point Times New Roman, violet
	Emphasized text	Chapter headings: Red, bold Subchapter headings: Black, bold Body text: Red or blue, bold	Body text: Bold italic	Body text: All caps
	Contrast between text and background	White background and dark colour text (mostly black)	White background and dark colour text (mostly dark grey)	White background and dark colour text (mostly violet)
	Page length	Moderate	Moderate	Moderate
	Contents presentation	Short paragraphs, bulleted and numbered lists	Two column, paragraphs, bulleted lists	Paragraphs
	Text alignment	Left aligned; bulleted and numbered lists are indented	Justified, but bulleted lists are left aligned	Left aligned
	Line spacing	Single spacing	Single spacing	Single spacing

2.4 Instrumentation

An online questionnaire approach was employed to study the users' preferences on the ebook design. The questionnaire consisted of two parts, where the first part solicited information on the demographic profile of the participants, and the second part gauged the design preferences among the participants. A combination of preformulated response item set and open-ended format set was used throughout the questionnaire.

Four items, namely consistency of navigation, ease of navigation, orientation clue, and crossreferencing between table of contents and contents, were used to evaluate the preferences in navigation design. Three items, specifically the amount of information on the page, arrangement of media, and table of contents, were used to assess the preferences in page layout; and five items, which are font, page length, legibility, typographical aspects, and ease of skimming/scanning, were used to gauge the preferences in content design. The participants were requested to decide on the ebook that is most preferred for each items mentioned above, as well as for overall ease of use and overall impression.

Besides that, the participants were asked on their perception on some navigation aids (i.e., crossreferencing, bookmarks, highlighting, and annotation functions), which are expected to enhance the navigation of the ebooks. Moreover, white spaces were provided to allow the participants to express their viewpoints and suggestions on the ebook design. Examples of some of the technical terms were also given to assist the participants in understanding and answering the questionnaire.

2.5 Procedure

The participants were invited to take part in the study in the computer lab. All participants were briefed on the purpose of the study. After that, they were instructed to access and browse through the assessment materials that were displayed on their computer screens, and to complete the online questionnaire, which was hosted on the researchers' File Transfer Protocol (FTP) server, under the close monitoring of the researchers.

In order to reach out to more participants, the researchers continued the study by inviting more students from MMU via email. Clear written instructions were provided. The participants were instructed to download the assessment materials from the researchers' FTP server, browse through the materials, and complete the online questionnaire. The data collection was not administered personally due to the difficulty in booking a computer lab and getting the participants to gather at a specific time because of their packed schedules.

The data collected was processed and analyzed using the Statistical Package for Social Science (SPSS) Version 16.0. Frequency distributions were computed for each item and compared across the three ebooks. The participants' viewpoints and suggestions on the ebook design were compiled and analyzed manually.

3. Results and Discussions

Ninety-nine completed questionnaires were returned by participants from various faculties. Of the participants 47 were males and 52 were females. The vast majority of the participants were undergraduate students. They made up 93.9% of the participants while the remaining were postgraduate students.

3.1 Preferences in Navigation Design

Table 2 shows that the participants preferred the navigation design of Book A in term of crossreferencing between table of contents and individual chapters, where there are links from the table of contents to chapters and subchapters of the ebook; and they preferred Book C in terms of consistency of navigation, ease of navigation, and orientation clue, where a dotted line is there to mark the end of each chapter. Nevertheless, it is acknowledged that the ebook committed one of the biggest mistakes in ebook design, specifically "missing page numbers" [15]. It was also noted that the navigation design of Book B was the least preferred, with each item scoring less than 18%.

3.1.1 Navigation Aids

Besides preferences in the navigation design, the participants were asked about the perceived usefulness of some navigation aids. Table 3 shows that the majority of the participants perceived the crossreferencing between pages, crossreferencing between contents and index page, and bookmarks, highlighting, and annotation functions as being able to enhance the navigation of the ebook. In connection with this, Gingras *et al.* [24] stated that highlighting and annotation are "very important functionality that must be made available", as users have become used to highlighting and annotating text while reading. This is parallel with the claim that "annotation is a natural and beneficial activity for users because it assists them in reading, writing, sense making, indexing, and retrieving" [25]. Furthermore, Marshall and Ruotolo [26] suggested to blend in a simple vocabulary of marks (i.e., asterisks, stars, and checks), which allows the users to highlight the passages that are deemed important or difficult.

The participants have also provided some suggestions on how to improve the navigation design of an ebook. The following are some examples of such entries:

Table 2: Navigation design preferences

Items	Book A		Book B		Book C	
	f	%	f	%	f	%
Crossreferencing between table of contents and individual chapters	46	46.5	17	17.2	36	36.4
Orientation clue	38	38.4	15	15.2	46	46.5
Ease of navigation	40	40.4	15	15.2	44	44.4
Consistency of navigation	40	40.4	16	16.2	43	43.4

Table 3: Perceived usefulness of suggested navigation aids

Items	Yes		No	
	f	%	f	%
Bookmark, highlight and annotation functions	94	94.9	5	5.1
Crossreferencing between contents and index page	87	87.9	12	12.1
Crossreferencing between pages	84	84.8	15	15.2

"Book A the topic is too general, need to include subtopics so that it is easy to click. Book B consider using treetype navigation for each topic."

"Provide links to link to index on every page"

"Navigation of the ebook must be simple and easy to let the reader have the interest to read through it."

"Bookmarking and highlighting should be good enough."

"Please make the article shorter, coz we feel so tired if we do too much scrolling. Make it shorter and clearer."

3.1.2 Ease of Navigation

The participants' suggestions on the navigation design are summarized in Table 4. Many of the participants requested for crossreferencing between pages, and wanted to have the subtopics included as the navigation links, so that it would be easier for them to get to the desired section. This suggests that ease of navigation is their main concern in navigation design. They expected a simple, direct, and detailed navigation structure, which would enable them to navigate through the ebooks with ease.

Coincidentally, these suggestions are also mentioned by Wilson and Landoni [19]. The guidelines mention "include a table of contents", where a table of contents with meaningful headings, and hyperlinks to individual chapters or sections are suggested. "Provide a search tool" is also mentioned, where both simple searches and advanced searches are proposed to accommodate a diver-

Table 4: Suggestions on the navigation design

	f	%
Provide crossreferencing to enhance navigation	13	39.4
Provide bookmarking, highlighting, and annotating functions	5	15.2
Provide orientation clues (e.g., breadcrumbs, current chapter)	4	12.1
Include table of contents	3	9.1
Use consistent style and colour coding for links	3	9.1
Provide overt, simple, and easy navigation system	2	6.1
Use short pages to avoid scrolling	2	6.1
Provide a search tool	1	3.0
Total	33	100.0

sity of users. Likewise, Gingras *et al.* [24] pointed out that a search tool, at least one that allows users to search across the table of contents and index, ought to be provided so that users can navigate through the text easily.

Other recommendations on navigation design include "use hypertext to enhance navigation and facilitate cross-referencing", where a strong overt structure and simple and clear navigation system are urged; use hypertext to link the table of contents to the individual chapters; index items to relevant sections and back to the appropriate section of the main text; main text to references and back to the appropriate section of the main text; main text to glossary (where available); between the pages of an ebook, such as page forward and page back; and from every page to browsing and searching tools (i.e., table of contents, index, and search engine); and provide a table of contents for each of the individual chapters [19].

3.1.3 Orientation Clue

In addition, standard colour coding for links should be used (i.e., unvisited links must unquestionably be blue and visited links must unquestionably be reddish or purple) [20]. Accurate and visible indications of a user's place in an ebook are also suggested, so that the users know their progress through the ebook [19]. In conjunction, Parker [15] highlighted that a lot of ebooks lack the page numbers that the users rely on to track their progress through a publication and to return to information that they have earlier read.

3.2 Preferences in Page Layout

Table 5 shows that the page layout of all three ebooks was preferred for various reasons. The participants preferred Book A for its table of contents, which provides a clear glance of the chapters and subchapters, as well as page number; Book B for its high amount of information on the page; and Book C for its arrangement of media, where the pages are framed and figures intersperse with body text in every chapter. It is also observed that Book A, which had fewer figures that intersperse with body text, was barely preferred in terms of arrangement of media.

3.2.1 Amount of Information

The participants' preferences suggest that they preferred pages that are dominated by contents, however, with some figures that intersperse with text, so that the pages will not appear as a mass of text. This is in agreement with the suggestion to dominate the pages by content of interest to the users, where in most of the cases, contents should take up 50% to 80% of a page design, whereby navigation should be kept below 20% of the space for destination pages [20]. Although the participants preferred to have figures blend in with texts, excessive use of multimedia should be avoided, as this can decrease usability of a design [20].

The participants have also expressed their ideas on how to enhance the page layout of an ebook. Some examples of such entries are as follows:

"Space the information. E.g. Book B, too much information and don't have space between. It's hard to read."

"Balance of text and images"

"Book B put it in one column"

"Layout must be tidy."

"Less complicated frames. Page number at bottom."

3.2.2 Arrangement of Media

A summary of the participants' remarks on the page layout is presented in Table 6. Results revealed that slightly more

than a quarter of the participants asked for a blending of text and figures to add colours to the pages and make them visually appealing. They also added that figures with border are preferred. Additionally, they suggested including plenty of white space to avoid cluttered pages, which they found hard to read. This is in accordance with the suggestion to avoid excessively compact pages without white space, but to use some white space to separate two segments of contents to help users understand the grouping of information and to lead the eyes [20]. Additionally, Parker [15] recommended separating new paragraphs with noticeably more space than line spacing within paragraphs, but not too much space until each paragraph is isolated.

Moreover, the participants asked for clean, tidy, and consistent page layout. Some of them also voiced their preference for single columned contents in place of double columned contents. Apart from these, there was participant who preferred less complicated page frame. In conjunction, Parker [15] asserted that framed pages portray a conservative and old fashioned impression. Hence, he recommended creating a more fashionable image using rules or lines of different weights at just the tops and bottoms of each page.

3.3 Preferences in Content Design

Table 7 depicts that the participants preferred Book A for its font and legibility and Book C for its page length, typographical aspects, and ease of skimming/scanning. The content design of Book B was found to be the least preferred in nearly all of the aspects, with each item scoring less than 28%. The item "font used" obtained the lowest score of 9.1%.

Some of the participants' suggestions on how to improve the content design of an ebook are extracted and listed as follows:

"Font size must be consistent."

"Highlighting the words as a main point"

"Include some point forms if the article has got factual points."

"Using headlines and showing the headlines with different types of font face"

Table 5: Page layout preferences

Items	Book A		Book B		Book C	
	f	%	f	%	f	%
Table of contents	46	46.5	23	23.2	30	30.3
Amount of information	25	25.3	40	40.4	34	34.3
Arrangement of media	10	10.1	35	35.4	54	54.5

Table 6: Suggestions on the page layout

	f	%
Intersperse text with images	11	26.2
Include plenty of white space to avoid cluttered pages	8	19.0
Provide clean, tidy and consistent page layout	7	16.7
Put the contents in single column	6	14.3
The page layout of Book B is nice	3	7.1
Include page number at the bottom of the pages	2	4.8
Pages should be dominated by content	1	2.4
Page size should be similar to the size of book	1	2.4
Use simple and plain background	1	2.4
Images should have border	1	2.4
Use less complicated page frame	1	2.4
Total	42	100.0

Table 7: Content design preferences

Items	Book A		Book B		Book C	
	f	%	f	%	f	%
Font	51	51.5	9	9.1	39	39.4
Legibility	40	40.4	25	25.3	34	34.3
Typographical aspects	26	26.3	27	27.3	46	46.5
Page length	30	30.3	25	25.3	44	44.4
Ease of skimming/scanning	36	36.4	22	22.2	41	41.4

"The colour of the words should be in contrast to the background. Typeface should be readable and comfortable to read."

3.3.1 Font

Table 8 summarizes the participants' suggestions on the content design. Results suggest that the participants preferred to have the same font face throughout the ebook and different font sizes and colours to distinguish between the body text and the various headings and emphasized texts. However, the participants did not demonstrate preferences for a specific font, where there were suggestions to use serif font faces, sans serif font faces, and decorative font faces. Nonetheless, Parker [15] pointed out that serif font faces are ideal for extended reading; sans serif font faces are very legible and suitable for headings and subheadings, combined with serif body texts; and decorative font faces should be constrained to logos and packaging, in which the image is more substantial than readability.

Besides that, many of the participants requested for consistent and readable fonts. This corresponds to Wilson and Landoni [19] and Nielsen [20], who mentioned that font size that is large enough to read easily for long period of time is recommended. However, Parker [15] alleged that many tend to set the font size too large (i.e., 12 points). He pointed out that font size that is too large is as difficult to read as one that is too small due to the lack of space for adequate number of words on each line, resulting less of comfort while skimming through the lines. On the other hand, Nielsen [20] mentioned that small font sizes should be relegated for information such as legal disclaimers and footnotes that are less likely to be read. Both [19,20] suggested using sans serif font faces, such as Verdana for small text.

3.3.2 Legibility

Moreover, the participants preferred pages with strong contrast between the background and the texts (e.g., white background and dark colour texts (mainly black) as in Book A). This conforms to the advice to use text colour that contrasts sufficiently with the background colour as mentioned by Wilson and Landoni [19] and Nielsen [20]. Positive text, which means black text on a white background, or negative text, which means white text on a black background, can be applied to attain optimal legibility. Nonetheless, negative text throws people off a little and slightly reduces the reading speed [20].

3.3.3 Typographical Aspects

As for typographical aspects, the participants preferred Book C, in which the headings and emphasized texts are fully capitalized, and the texts are left aligned. The

Table 8: Suggestions on the content design

	f	%
Use consistent and readable font	19	38.8
Write for scannability (e.g., use short paragraphs, bulleted lists, headings, different font style and colour for headings)	9	18.4
Use high contrast between background and text colour	6	12.2
Use more but consistent colour	3	6.1
Highlight keywords	3	6.1
Use simple sentence structure	2	4.1
Use Sans Serif font	2	4.1
Use fancier font	2	4.1
Use Serif font	1	2.0
Use colourful cover page	1	2.0
Keep pages short	1	2.0
Total	49	100.0

preferred alignment of text is in line with the suggestion to flush the text left, as the uniform starting point for the eyes to start scanning allows the users to read at a faster speed [20]. This is further justified, such that most of the participants found Book A and Book C, which had left aligned texts, easier to read and skim through in comparison to Book B, which had justified texts. Nonetheless, Parker [15] urged to avoid fully capitalized headings because such headings are more difficult to read due to the lack of distinctive shapes that are found in words set in lower case characters. Additionally, fully capitalized headings occupy a third more space compared to those set in both upper and lower case letters.

3.3.4 Scannability

Although the text in Book A was presented in a combination of short paragraphs, bulleted lists, and numbered lists, and was expected to be the most preferred ebook in term of ease of skimming/scanning, a few more participants (5%) were found to prefer Book C, in which all the texts was in paragraphs. A possible explanation is that, the sentence structure in Book C was kept simple and the contents were presented in well organized paragraphs. However, the participants were still expecting succinct contents and the use of bulleted lists whenever appropriate to ease skimming/scanning. This coincides with the suggestions to keep the contents succinct, such that the contents in the electronic publication should not be more than 50% of the texts that would be written for the same contents in a paper publication; and to use bulleted list or similar design elements, so that the contents will not appear as a flow of uniform text blocks [20].

In addition, the participants suggested using headings to improve the scannability of the contents. They also added that the font settings used for the headings should differ from the ones used for the body texts. Likewise, Nielsen [20] suggested structuring articles with two, or even three, levels of headings due to the users' habit of skim-

ming instead of reading. Parker [15] also pointed out that inserting frequent subheadings through the texts is the best way to chunk the contents, as well as attract users' eyes and provide an extra entry point to read the texts that follow. In order to make the headings noticeable, a strong visual contrast between the headings and the adjacent paragraphs, such as by using larger and/or bolder fonts, is essential [15]. The same applied to emphasized texts, where it is important to catch the users' attention.

3.3.5 Page Length

In line with the suggestion to keep pages short, Wilson and Landoni [19] recommended creating pages of a similar length to the paper pages, as long pages are difficult to scan and require more scrolling, whereas very short pages require frequent "turning" of pages, which can also be annoying. On the other hand, Nielsen [20] recommended connecting contents by means of hypertext links, such that long pages are chunked into several short pages that are connected by hypertext links. The same idea can be applied to ebooks, by appropriate chunking of information and providing hypertext links to the other contents, such as table of contents, other chapters, subchapters within the particular chapter, and index page. It is also vital to ensure that the most significant links are noticeable on most common monitors without having to scroll, as users tend to choose from among the visible options [20].

3.4 Overall Preferences

Table 9 depicts that Book A was the most preferred in terms of overall ease of use, followed closely by Book C, which was also most preferred in terms of overall impression. Book B was the least preferred in both overall ease of use and overall impression.

3.4.1 Overall Ease of Use

Some of the participants' comments and suggestions on how to enhance the overall ease of use are listed as follows:

"Allowing user to click at table of content resembling to normal book usage, where users tend to skip or jump to the section they prefer."

"Put up more pictures and graphics."

"Add more hyperlinks and bookmarks into the ebook so that if readers are confused about some topic in the current page, they can just navigate the bookmark without need to scroll and search the relevant topic"

"Navigation of information is very important for reader to obtain information for the text. As a result, this part

Table 9: Overall preferences

Items	Book A		Book B		Book C	
	f	%	f	%	f	%
Overall ease of use	45	45.5	14	14.1	40	40.4
Overall impression	28	28.3	22	22.2	49	49.5

Table 10: Suggestions on the overall ease of use

	f	%
Ease of navigation	19	47.50
Ease of skimming/scanning	8	20.0
Attractive appearance	6	15.0
Use of multimedia elements to aid explanations	5	12.5
Legibility	2	5.0
Total	42	100.0

should be stressed on."

"Avoid lengthy pages. Synchronize the justification of the text. Standardize the line spacing of the text."

Based on the participants' feedback, suggestions on the overall ease of use are summarized and presented in Table 10. It is learnt that page design, specifically linking, greatly affects overall ease of use of an ebook. The participants preferred clear and direct navigation (e.g., crossreferencing between table of contents and contents), which makes it easy to navigate through the ebook. There were also participants who shared the idea that ease of skimming/scanning improves overall ease of use of an ebook. This is probably because it is easier for them to spot the contents of interest out of the blocks of texts.

3.4.2 Overall Impression

Some of the reasons given for the best overall impression of Book C [Table 9] are extracted and listed below:

"1. It has picture in the book making it more interesting and the layout of the book is more resemble like a real book rather than word document. 2. The font used in the book is quite appropriate so that the readers will not need to zoom in and zoom out."

"It has best layout and easier readability"

"It is colourful, easy to navigate and has a good layout."

"I will choose Book C due to its attractiveness of images and layout. Book B and C do not have this attraction to readers."

"Easy navigation and high readability."

The reasons given by the participants were compiled and are presented in Table 11. It is observed that attractive appearance was the main factor that leads to the best

Table 11: Factors that contribute to the best overall impression on Book C

	f	%
Attractive appearance	16	40.0
Content design (e.g., legibility, scannability, font used)	9	22.5
Good layout	7	17.5
Ease of navigation	6	15.0
Ease of use	1	2.5
Resemble the look and feel of a paper book	1	2.5
Total	40	100.0

impression of Book C. Many of the participants found Book C visually appealing because it is more colourful and has more figures. Other aspects that contribute to the best overall impression of Book C include content design (e.g., font, scannability, and legibility), good layout, and ease of navigation.

4.   Conclusions

This study examined the ebook design preferences in terms of navigation design, page layout, and content design among MMU students. Since higher education institutions are key players in the adoption of ebooks, the students' preferences and acceptance for ebooks influence the success of ebooks. Results reveal that overall ease of use is highly associated with ease of navigation and ease of skimming/scanning, whereas overall impression is especially dependent on the appearance of an ebook. Many of the students' preferences in the ebook design conform to some design and usability guidelines. It is acknowledged that the guidelines highlighted in this paper can only provide some general direction for designing ebooks that are appropriate for MMU students. These suggestions, however, will continue to form the foundation for ongoing exploration of the design of favourable ebooks.

References

1.   M.R. Nelson, "Ebooks in Higher Education: Nearing the End of the Era of Hype?" *Educause Review*, pp. 40-56, Mar.-Apr. 2008.

2.   K. Obradovic, "Ten Years On: Ebooks at the University of Auckland Library," in *Elsevier Library Connect Seminar, Auckland*, 2008.

3.   A. Bakeri, A. Bakar, and K. Abdoulaye, "Collection Development of the Digital Age: The Case of Malaysia," in *International Conference on Asian Digital Libraries, Singapore*, Dec. 2002, pp. 366-78.

4.   Vlib, [Online]. *Available: http://vlib/2005/aboutlib.php* [cited in Feb. 2008].

5.   Open University Malaysia, [Online]. *Available from: http://www. oum.edu.my/portal/index.php?op=viewandm=6andpage=31* [cited in Jan. 2009].

6.   H. Chu, "Electronic Books: View Points and Users and Potential Users," *Library Hi Tech*, vol. 21, no. 3, pp. 340-6, 2003.

7.   P. Mercieca, "Ebook Acceptance: What Will Make Users Read on Screen," in *Victorian Association for Library Automation Inc. (VALA) Conference, Melbourne*, Feb. 2004.

8.   R. Ismail, and A.N. Zainab, "The Pattern of Ebook Use amongst Undergraduates in Malaysia: A Case of to Know is to Use," *Malaysian Journal of Library and Information Science*, vol. 10, no. 2, pp. 1-23, 2005.

9.   K.T. Anuradha, and H.S. Usha, "Use of E-books in An Academic and Research Environment: A Case Study from the Indian Institute of Science," *Program: Electronic Library and Information Systems*, vol. 40, no. 1, pp. 48-62, 2005.

10.   G.G. Chowdhury, "Access and Usability Issues of Scholarly Electronic Publications," In G. Gorman, and E. Rowland (Eds.), Scholarly publishing in an electronic era. Facet publishing, 2004. Included in G. Gorman (Eds.), *International Yearbook of Library and Information Management* [Online], pp. 77-98, 2004-2005. *Available from: http://www.cis.strath.ac.uk/research/publications/ papers/strath_cis_publication_3-15.pdf.* [cited in Oct. 2007].

11.   C. Malama, M. Landoni, and R. Wilson, "What Readers Want: A Study of Efiction Usability," *DLib Magazine*, vol. 11, no. 5, 2005.

12.   M. Landoni, R. Wilson, and F. Gibb, "From the Visual Book to the Web Book: The Importance of Design," *The Electronic Library*, vol. 18, no. 6, 2000.

13.   S. Rowhani, and K. Sedig, "Ebooks Plus: Role of Interactive Visuals in Exploration of Mathematical Information and Elearning," *Journal of Computers in Mathematics and Science Teaching*, vol. 24, no. 3, pp. 273-98, 2005.

14.   R. Wilson, J. Shortreed, and M. Landoni, "A Study into the Usability of Eencyclopaedias," in *ACM Symposium on Applied Computing, Nicosia, Cyprus*, Mar. 2004, pp. 1688-92.

15.   R.C. Parker, The 14 Biggest Ebook Design Mistakes. *DT and G*, 2004.

16.   R. Wilson, M. Landoni, and F. Gibb, "Guidelines for Designing Electronic Textbooks," in Proc. *The Sixth European Conference on Research and Advanced Technology for Digital Libraries, Rome, September* 2002, pp. 47-60.

17.   S. Norshuhada, S. Hassan, and M. Landoni, "A Usability Study for Promoting eContent in Higher Education," *Journal of Educational Technology and Society*, vol. 6, no. 4, pp. 112-24, 2003.

18.   Joint Information Systems Committee, [Online]. *Available from: http://www.jisc.ac.uk/coll_ebookstudy2.html* [cited in Oct. 2005].

19.   R. Wilson, and M. Landoni, "EBONI Electronic Textbook Design Guidelines," [Online]. *Available from: http://ebooks.strath.ac.uk/ eboni/guidelines/.* [cited in Oct. 2007].

20.   J. Nielsen, Designing Web Usability: The Practice of Simplicity, *Indianapolis: NewRiders*, 1999.

21.   J. Nielsen, "Change vs. Stability in Web Usability Guidelines," [Online]. *Available from: http://www.useit.com/alertbox/guidelines- change.html.* [cited in Feb. 2008].

22.   P.F. Chong, Y.P. Lim, and S.W. Ling, "Ebook Design Preferences: A Case Study," in *International Symposium on Information Technology, Kuala Lumpur*, Aug. 2008, vol. 1, pp. 1-8.

23.   Multimedia University, [Online]. *Available from: http://onlinecyber/ main/index.jsp.* [cited in Jan. 2009].

24.   L. Gingras, M. Eescobar, E. Quintero, and T. Shah, "Comparative Analysis of EReaders: The Sony Reader PRS505," [Online]. *Available from: http://leannagingras.com/comparativeanalysis.pdf.* [cited in Jan. 2009].

25.   J.K. Kim, R. Farzan, and P. Brusilovsky, "Social Navigation and Annotation for Electronic Books," in BooksOnline'08, California, Oct. 2008, pp. 25-8.

26.   C. C. Marshall, and C. Ruotolo, "A Study of Reading on Small Form Factor Devices," in *Joint Conference in Digital Library, Portland*, July 2002, pp. 56-64.

AUTHORS

Chong Pei-Fen completed her B.IT (Hons) Software Engineering from Multimedia University (MMU) Malaysia in 2003. At present, she is a MSc student within the Faculty of Creative Multimedia (FCM) at MMU. Her research interests include e-learning, web and mobile devices usability, and human machine interfaces.

E-mail: pfchong@mmu.edu.my

Yan-Peng Lim is lecturer and researcher in Faculty Creative Multimedia at Multimedia University. Her research interests are in interactive design for information, edutainment game and installation art. She teaches GUI and HCI in Digital Media Department.

E-mail: forest.lim@mmu.edu.my

Ling Siew-Woei received her BAA (Hons) Fine Art from the University of Malaysia Sarawak (UNIMAS) in 1998. She then completed her Master of Science (Creative Multimedia) from Multimedia University (MMU) in 2004. She is currently a lecturer and Ph.D. student within the Faculty of Creative Multimedia (FCM) at MMU. Her research area is in instructional design: a framework for designing Web-based courses.

E-mail: swling@mmu.edu.my