AN E-BOOK BUILDING METHODOLOGY USING AN EXTENSIBLE PERSONALIZATION STRUCTURE FOR OPERATIONALIZING E-BOOK INTERFACE METAPHORS

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2010

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by

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Thesis submitted in fulfillment of the requirements
for the degree of
Doctor of Philosophy

October 2010

ACKNOWLEDGEMENTS

I would like to express my gratitude to my supervisors. I thank my main supervisor, Dr. Cheah Yu-N, for his excellent skills, for his expert advice, and for his dedicated service during the period of my candidature. I am also thankful to my co-supervisor, Associate Professor Muhammad Rafie Hj. Mohd. Arshad, for his excellent skills and for his expert service.

I am grateful to my academic communities at the School of Computer Sciences and the Institute of Graduate Studies for the use of the various facilities and for their kind assistance.

I am thankful to all the students who have helped me by participating in the research survey and contributing their valuable practical experiences.

I am very grateful to my father, Mohamed Meerasa bin Ahamad, for his love, care, and support. I thank my sister, Nurdiyana binti Meerasa for her love and moral support.

Most importantly, I thank Allah, for "*He is Allah (God), the One*" (Quran 112-1).

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KAEDAH PEMBANGUNAN BUKU ELEKTRONIK MENGGUNAKAN STRUKTUR PERIBADI BOLEH DIPERLUAS UNTUK PENGENDALIAN METAFORA ANTARA MUKA BUKU ELEKTRONIK

ABSTRAK

Buku elektronik (e-book) menggambarkan struktur/fungsi buku tradisional dalam bentuk digital. Dalam bentuk digital, perkhidmatan multimedia/hipermedia serta ciri-ciri khas yang lain dapat disertakan. Rangka-rangka kerja e-book semasa mempunyai kelemahan dalam format perwakilan mereka, terutamanya dalam e-penerbitan akademik. Masalah-masalah yang wujud termasuklah perperibadian e-book oleh pengguna, sokongan kepada penerbit e-book dan format fail. Para pengguna mungkin memerlukan keupayaan tambahan seperti penstrukturan dan susun atur e-book. E-book tidak menyediakan susun atur yang fleksibel untuk para pembangun kandungan untuk menghasilkan struktur pemperibadian e-book. Sebaliknya, pemperibadian e-book memerlukan format fail untuk perwakilan kandungan digital, membolehkannya mudah alih dan saling dikendali. Untuk menangani masalah-masalah ini, tesis ini bertujuan mengenal pasti keperluan elemen pemperibadian, untuk memperwakilkan pemperibadian e-book, untuk memformalkan komponen pemperibadian e-book, dan membangunkan pakej kawalan dan piawaian e-book. Ini boleh dicapai dalam tiga fasa: perwakilan/pemperibadian,

spesifikasi pembina, dan analisis praktikal e-book. Dari segi perwakilan/pemperibadian, kajian ini menampilkan seni bina Pemperibadian E-Book Boleh Diperluas (XEBPER) yang mengandungi tiga objek struktur (iaitu pakej, visual dan metafora), serta empat objek fungsi (iaitu media, kawalan kandungan, kawalan alatan, dan pengemaskinian buku). Dalam fasa yang berikutnya, pembina e-book dibangunkan berdasarkan struktur XEBPER. Ia membangunkan komponen e-book dengan istilah-istilah generik seperti format, perpustakaan, taxonomi, metafora, pemperibadian, penghurai, tetingkap, pembaca, dan operasi. Akhir sekali, satu soal selidik telah dijalankan dengan 50 orang pelajar untuk menilai 11 ciri-ciri yang telah dikenal pasti (iaitu metadata pakej, katalog perpustakaan, keselamatan, saling kendali, visualisasi, ciri-ciri dan taksonomi multimedia, hiperteks, penanda buku, keupayaan carian, pelampiran fail, dan carian web). Penilaian tersebut telah membandingkan struktur XEBPER dan *Portable Document Format* (PDF) dan hasilnya menunjukkan bahawa struktur e-book yang menggunakan keupayaan yang boleh diperluas/pemperibadian menunjukkan prestasi yang baik dari segi ciri-ciri. Oleh itu, rangka kerja pemperibadian e-book XEBPER telah didapati sesuai digunakan terutamanya untuk pengkonsepsian e-book.

AN E-BOOK BUILDING METHODOLOGY USING AN EXTENSIBLE PERSONALIZATION STRUCTURE FOR OPERATIONALIZING E-BOOK INTERFACE METAPHORS

ABSTRACT

An electronic book (or e-book) presents traditional book structures/functions in digital form. In digital form, it is able to include multimedia/hypermedia services as well as other special features. Present e-book frameworks have shortcomings in their representation format, especially for academic e-publishing. The problems include the e-book personalization by user, the support for e-book publisher and the file format. Users may require additional capabilities such as e-book structuring and layout. E-book does not provide a flexible layout to content developers to come out with an e-book personalization structure. However, e-book personalization requires a file format for digital content representation, portability and interoperability. In order to address these problems, this thesis aims to identify requirements of personalization elements, to represent e-book personalization, to formalize e-book personalization components, and to develop e-book packaging control and standards. These are achieved in three phases: the representation/personalization, builder specification, and e-book practical analysis. In terms of representation/personalization, this research presents an e**X**tensible **E**-**b**ook **Per**sonalization (XEBPER) architecture which consists of three structural objects (i.e.

package, visual, and metaphor), and four functional objects (i.e. media, content control, device control, and book update). In the next phase, the e-book builder is developed based on the XEBPER structure. It builds e-book components with generic terms such as format, library, taxonomy, metaphor, personalization, parser, window, viewer and operation. Finally, a survey is conducted on 50 students to evaluate the 11 features that were identified (i.e. package metadata, library catalogue, security, interoperability, visualization, multimedia characteristics and taxonomy, hypertext, bookmark, search capability, file attachment, and web search). The evaluation compared XEBPER and Portable Document Format (PDF) structures and the results indicated that e-book structures that employ extensible/personalization capabilities resulted in better performance in terms of features. Therefore, the XEBPER e-book personalization framework is found to be suitable especially for e-book conceptualization.

CHAPTER – 1 INTRODUCTION

“We are very pleased with the new open container format. Adoption of this standard means we can produce a single 'e-Book' for distribution, rather than having to create one vendor-specific e-Book for each reading system. Open e-Book Publication Structure Container Format (OCF) will allow us to publish more titles as e-Books, which will help fuel the growing e-Book market." - Neil De Young

1.1 Electronic Publishing

Electronic publishing (e-publishing) refers to any type of the digital publication such as e-books, electronic articles, digital libraries and catalogues. Historically, the term was used to mean the current offerings of online and web publishers such as the production, distribution and user interaction in accordance with production of text and other interactive media using computer-based methods.

In addition to internet publishing, e-publication is also produced in non-networked environments such as encyclopedias, CD/DVDs, and technical and reference resources distributed with mobile phones or devices. There is a wide variety of e-published material ranging from restaurant menus, college textbooks, magazines, novels, annual reports, travel brochures, posters and leaflets. It also allows richer communication, updates, easy navigation, and hyperlinks.

An electronic book (e-book), also known as a digital book, refers to the digital publication that resembles the ordinary book publication. It is rendered to be displayed on output devices, e.g. computer screens. E-book content is presented in plain text, or multimedia/hypermedia and other graphic illustrations. It is mainly used to publish e-textbooks, e-articles, e-journals, e-magazines, e-newspapers, e-advertisements, collections of electronic photos or albums, and technical manuals. Digital libraries and e-bookstores provide quick access to digital publications.

E-book publication is produced with either proprietary or non-proprietary specifications. In recent years, many e-book applications are provided in proprietary format. Organizations, institutions and potential volunteers are working for identifying technical challenges, i.e. end-users, display, content, distribution and storage, standards or dominant design for the next generation of e-books that facilitate authors, publishers, and content developers. The e-book interoperability issue has been presented by various groups: E-book Working Group (EWG), E-book Task Force (ETF), as well as software developers and hardware manufactures.

E-book offers many advantages such as the ability to publish e-books in large number of copies, lower cost of distribution, the ability to play clips of music, video, poetry, and the ability to support multiple languages. It is mainly used for portability, inter-operability, fast accessibility and affordable cost.

An e-book is classified into four types of reading environment:

i. *Downloadable e-book* which is deployed on the web in a format that is downloaded onto an appropriate device.

ii. *Dedicated e-book* which is presented on small hand-held devices.

iii. *Web accessible e-book* which is also mounted on the web for online reading.

iv. *Print-on-demand* e-book which allows the printing of a copy of the book whenever it is requested.

Many e-book applications were introduced with features to simulate the logical and physical aspects of the original printed book. Logical aspects include the identification of a book hierarchy or abridged material such as chapters, outline, summary and notes. Physical aspect included the physical components of the printed book such as metaphor, portability, and graphic design enhancements.

1.2 Background to E-book Problem

Present e-books are not represented in a personalizable way and do not utilize the necessary e-book elements: structure/content, the e-book features and standardization. The overview of e-book problems are shown in Figure 1.1.

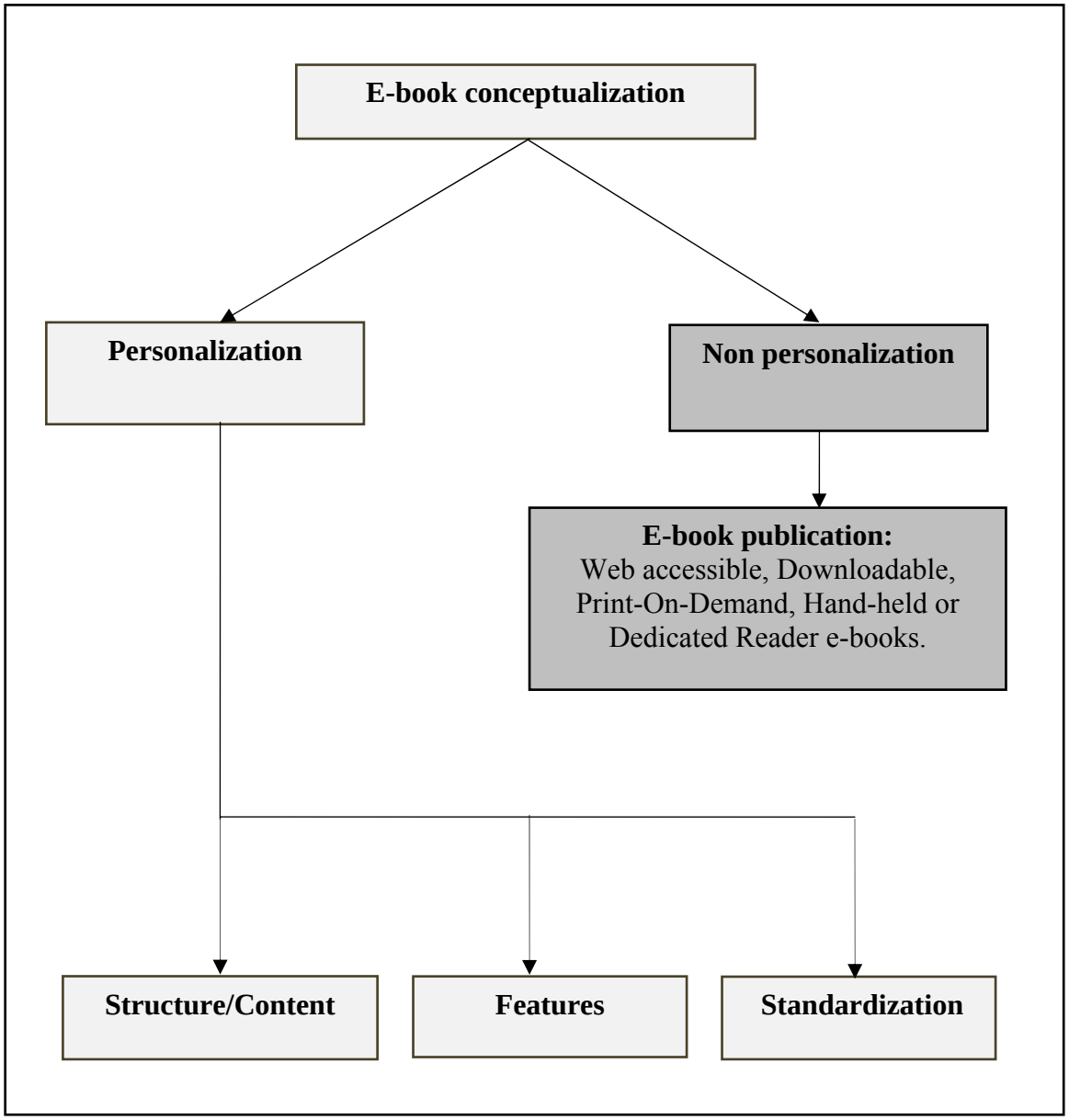

Figure 1.1 The hierarchical problem structure for e-book personalization

E-book users have difficulties with e-book documents and presentation styles, e.g. the formats to be used with e-book documents. The format (i.e. proprietary or non-proprietary) describes the encryption level that protects the contents with copyright protection control.

E-book also focused on the efficiency in publishing. It includes content and presentation styles, i.e. pages can be flipped and read on-screen coherently. This publishing method has shown many of the characteristics and features (such as structure/content layout and reading behavior) that are similar to conventional book publication.

The structure part of current e-books are front, main and back sections. Front section described about pages as the front cover, title, copyright, author, table of content, acknowledgement and preface. The main section described on the customization of the authors' original contents with parts, chapters, pages and sections. The back section described the application, bibliography, index and back cover pages. The content part included the author's original concepts and presented in plain text (i.e. ASCII characters), multimedia or hypermedia.

Current e-book applications have drawbacks in their browsing features (e.g. multiple documents browsing via hyperlinks in HTML is not efficient), e-book inter-operability (e.g. many features such as import/export of contents, viewing from different platforms/applications still needs to be enhanced) and personalization (e.g. E-book Reader software is not customizable) (Adobe Systems Incorporated, 2004; Norshuhada, 2002; OeBF, 2002). These are discussed in the following section:

i. *Browsing features:* The e-book needs enhancements for the navigation feature such as a hyperlinking mechanism that would support all kinds of reading. The e-book

reading should support the exploration of the author's original messages such as page segmentation and hyperlinks (Wilson & Landoni, 2002).

ii. *E-book inter-operability:* The e-book content should be analyzable by e-book reader applications. It needs functionalities for inter-operability across e-book formats such as PDF, LIT, HTML, etc.

iii. *Personalization*: The e-book representation needs customized e-book structure/content components that would facilitate fast searching, dynamic capabilities, multimedia characteristics, and content organization and synchronization. In addition, the e-book builder should possess advanced features such as bookmarks, hyperlinks, highlighting/underlining, printing, file attachment, network connectivity, comments/messages, note-takings, object linking and embedding, customization, library catalog, dynamic content presentation/styles, paging, and the skipping the pages in backward and forward directions.

1.3 Problem Statement

There are essentially three important problems identified in this research: the e-book personalization by user, the support for publisher, and the format.

1.3.1 E-book Personalization by User

Users may require the additional capabilities in terms of e-book personalization such as structure and layout. The e-book personalization structure needs to be represented and described extensively. Details that users may want to personalize may be in terms of the presentation layout control, page metaphor such as screen size, margins, page number,

sections, and font. Presently, these are not possible because of the current limitations. E-book design should come with extensible layout for representing e-book fundamentals.

1.3.2 Support on E-book Personalization for Publisher

The present e-book applications does not provide flexible layout to content developers (e.g. publisher, author, librarian and developer) to come out with e-book structures with personalization function. Specifically, university publications with e-textbook/e-book structures need to be focused for facilitating the e-publishing model.

1.3.3 E-book Format

E-book personalization package requires the format structure for e-book portability and interoperability. The format structure has to include the specification standard. It may require generic technology such as Digital Rights Management (DRM) functionality.

1.4 Research Questions

The research processes/activities aim to address the following three research questions:

i. How can e-book document be described to represent the extensibility and personalization mechanism?

ii. How does an e-book builder specification describe about e-book building and output rendering methodology?

iii. How can an extensible e-book personalization technique be designed to conform to the publication structures in terms of its quality and features?

1.5 Research Objectives

The primary research objectives are as follows:

i. *To study the current e-book publication documents and standards:* The e-book publication structure is divided into proprietary (or the "closed" specification) and non-proprietary (or "open" e-book). E-book personalization should ideally support both structures. E-book inter-operability allowed for exchange the documents between several platform/application. E-book structure is enhanced with extensible representations and personalization mechanisms that would produce the advance e-book conceptualization.

ii. *To identify the criteria or feature for extensible and personalization features:* E-book has two important principles: the extensible and personalization features. Extensibility is applied on the extensive structure and behavior, e.g. the ability to add, modify or remove certain parts from the markup structure. The integral e-book design components explored several features, properties and attributes: package descriptions (i.e. e-book library identifier and organization, user information and categories), publication (i.e. metadata such as author and co-author, title, International Standard Book Number (ISBN), Document Object Identifier (DOI), edition and editor), publisher (i.e. name of publisher, address, e-mail and website), visualization technique (i.e. settings on layout, font, background styles and themes), e-book metaphor (i.e. parts, chapters, pages, header, body of sections, footer) and the content enhancements (i.e. multimedia characteristics/taxonomy and hypermedia), content control elements (i.e. content synchronization, start-up application), device control elements (i.e. annotation,

bookmark, comment message) and additional information abut e-book contents (i.e. web resources and file attachments).

iii. *To design the architecture for the extensible e-book personalization:* E-book architecture utilizes the extensible e-book personalization architecture for building e-book publication documents. Obviously, it includes the characteristics, quality and properties that are necessary. For example, an e-book body element is composed of several extensible components: part, chapter, page, header, body of contents (text, image, audio, and video) and footer. The e-book personalization features include the capabilities for content presentation/styles and the portable structure (e.g. ISBN/DOI metadata that customize the contents.

iv. *To develop an e-book builder architecture/specification with the extensible and personalization components:* The e-book builder specification integrates the e-book personalization structure. It includes builder components which consist of the personalization library and accessing components. Accessing components presents file property specification on computer, taxonomy that categorizes multimedia characteristics/classification with advanced settings, metaphor that presents instructional and learner guidance, personalization that produces the intellectual information which is specific to particular situation or learners, parser that evaluates e-book personalization structure standards, viewer that renders the e-book personalization structure in order to display on output and operation that performs e-book properties and its execution with the contents on e-book builder application.

1.6 Scope

The main scope of this research is for developing a university e-publishing model with e-book. It describes the requirement of personalization features such as metaphor, publisher standard and e-publishing method. As a result, the publisher will meet the following constraints:

- *Metaphor*: The e-book design/feature will cater for university students as many universities are focusing on the integration of new technology such as e-book that are suited for e-learning.
- *Support*: The e-book concept will support e-publishing.
- *Service*: In accordance with a university e-publication model, this study will focus on the requirements for publishers who intend to come out with extensible/personalization techniques.

1.7 Contribution

The major contributions for the research are on the e-book structure/content representation, e-book builder and personalization tool. These are discussed in the following sections.

1.7.1 E-book Structure/Function

E-book structure/function components will provide the personalized e-book components. It implements an eXtensible Markup Language (XML) like markup structure to present

e-book contents. This will be discussed in Chapter 4. The e-book formalism will greatly benefit e-publishing, such as facilitating self-publishers, authors, publishers, librarians, developers and potential customers or users. The e-book extensibility/personalization mechanism provide dynamic capabilities, e.g. customized environment for e-reading purposes.

1.7.2 E-book Builder Structure

E-book builder structure provides enhancements over the extensible and personalization mechanisms by specifying additional capabilities and functionalities. This will be discussed in Chapter 5. It will be utilized for publishing textbooks (or e-textbooks) for university students. It will support e-publishing in three ways: creating/publishing original contents, the translation of printed books into e-published versions, and the rewriting of old e-publication, e.g. by use of HTML and PDF formats.

1.7.3 E-book Personalization and Standard

The e-book package control will utilize an XML-like markup structure, which is advantageous in the following applications:

- *Content interoperability:* E-book package control supports the personalization capabilities with DRM framework that will provide e-book interoperability between various e-reader software, format, etc.

- *Export:* Since e-book personalization is designed with XML-like encoded output form, the source code could be exported as an "open e-book", i.e. XML/HTML formats, as output.
- *Publisher*: The digital contents supported with the DRM framework, the secure functionality benefits publishers to present e-book contents across several e-reader software, reading format, or devices.

1.8 Thesis Outline

The thesis is organized as follows:

Chapter 1: This chapter presents the general background information about e-books and this research.

Chapter 2: This chapter elicits important state-of-the-art on e-books from academic and general publications. It also analyzes the current problems.

Chapter 3: This chapter presents the research approaches, instrumentation tool, context and implementation for discovering and contributing on the ultimate goals and objectives.

Chapter 4: This chapter represents the e-book personalization framework with the diverse integral components that would provide an enhanced structure and content layouts.

Chapter 5: This chapter provides standard markup procedures with Structure and Content entities (elements and attributes), more analysis on functional objects and usage. The E-book Builder software prototype is presented to highlight these principle ideas.

Chapter 6: This chapter evaluates the research contributions using the software prototype and a survey. The typical e-book model preferences and perceptions among university student participants would be analyzed.

Chapter 7: This chapter concludes the thesis, connecting the main points that are discussed in the whole thesis.

1.9 Conclusion

This chapter presented some background knowledge about e-book for e-publishing. This study focuses on e-publication in general, and e-books in universities in particular. The problem is basically on the e-book personalization issue. The issue discussed is how to provide the facility so that users can personalize e-books. The publishers on the other hand can develop e-books with user personalization structures in place. The research objectives are to explore various inter-related links for the e-book structure, e-book

design guidelines with representation/personalization, e-book builder framework and e-book package control.

CHAPTER 2 – LITERATURE REVIEW

*"**O**pen eBook Publication Structure (OEBPS) **C**ontainer **F**ormat (OCF) addresses two big problems faced by eBook publishers. It provides publishers with a single transport format for sending publications to the distribution or sales channel, and it's also the recommended format for delivering the final publication to an eBook reading system."* - John Rivlin

2.1 Introduction

This chapter discusses the important topics on e-book conceptualization. It explores both the important and current difficulties on e-book technology. At the outset, the background topics include the e-book phenomenon, e-book in e-publishing, e-book challenges, e-book principles, e-book features and e-book metaphor. Following these, the e-book implementation for educating students is discussed. E-textbook practical design guidelines are also explored with instructional design and theory. The following sections also present critical analyses on e-book technology.

2.2 E-book Definition

Computers and networks provided significant contribution to our society over the past two decades. The current developments on Information and Communication Technology (ICT) fields have changed rapidly. The knowledge of basic computer application has supported the education of students, e.g. with the availability of electronic material for

computer science curriculum. More importantly, the e-book technology has enhanced the e-publishing industry. In simpler form, an e-book is described as follows:

The Open eBook Forum (OeBF) or International Digital Publishing Forum (IDPF) uses three e-book terms: e-book, e-book builder and hardware reading devices. Popularly, an e-book is referred to any publication document contents in digital form. E-book builder is referred to as software application that is utilized for reading, viewing and interpreting the e-publication documents on a computer. The reading device is referred to a specific portable and remote hardware device or application for reading/viewing contents (OeBF, 2000).

The e-book concept has existed in the e-publishing industry since the past two decades (Hillesund, T., 2001). Additionally, the specific term "e-book" was also proposed by popular companies such as TechWeb, Amazon, News.com and Wired. Adobe® systems Inc., Microsoft®, Barnes & Noble and Powells.com proposed "eBook" or "ebook" (Cesarini, 2002).

According to researchers and publishers (Hawkins, 2002; Hillesund, 2001), the definition for e-book refers to "the equivalent digital publications for the printed book documents". E-book was also described as "the characteristics of new publishing revolution, especially for the printed book publications with good business model, strategy and better reading devices".

Hillesund (2001) defined e-book as a collection of digital documents with reading software or devices, network accessibility, DRM, metadata and navigation tools. According to the report by the Library of Congress (National Digital Information Infrastructure and Preservation Program [NDIIPP], 2002), the e-book is the collection of electronic documents or files which can be displayed on a computer screen.

However, Lombardi (2007) has described e-book as electronic text for publishing a book, magazine, journal, poem, cookbook and travel guide. Mann (2001) also pointed out that an e-book contains features of an ordinary book publication in addition to the e-book technologies. Cannon and Watson (2001) referred e-book as a simple translation of the printed book publication into e-book document format.

Typically, the e-book describes the software objects as well as physical appliances. Software object describes the file document and contains the e-contents. E-book publication can be downloaded from the Internet and read using special physical devices, known as e-reader. An e-book is being considered as an electronic version of an ordinary book publication. It also shares the look and feel of the ordinary book structure.

2.3 E-publishing with E-textbooks and E-books

According to Gordon, Kung and Dyck (2008), e-publishing is the additional medium to present the contents to multiple distribution channels that will include technologies such as e-books and print-on-demands, CD-ROMs, e-libraries. The authors represented the e-book with the following criteria:

i. An electronic text that is visualized to the readers on screen.

ii. Software Reader that focused the presentation layout on screen with multimedia such as text, images, audio and video.

iii. The content that is supported with one or more files such as HTML, XML, PDF, or LIT.

iv. The book metaphor is emphasized in the e-book.

Ormes (2001) stated that e-book is used for e-text monographs such as novels, stories, dictionaries and diaries on websites and accessed with three types of readers such as hand-held devices (e.g. Personal Digital Assistant (PDA), Palmtops), Dedicated Readers (e.g. Softbook and Rocket eBook) and Desktop Reader applications (e.g. Microsoft Reader and Adobe Acrobat eBook Reader).

Tsapko (2005) studied about the transformation of scholarly artifacts towards e-publishing methods. The ordinary publications such as printed book, any collection of records, posters and lessons by teachers are republished as e-publications. Authors utilized the e-textbook publication method and published by using various software applications such as ToolBook Assistant or Instructor, Java programming and Macromedia Flash programs.

Schoch, Teoh and Kropman (2006) studied about the online e-textbook implementations for postgraduate students in Australian universities. The study results showed the e-book

preferences of students, educators, publishers and university administrations regarding e-reading experiences and technical aspects.

NDIIPP (2002) also reported on e-publishing for scientific, technical, professional, academic and fiction. This study described the advantages of e-publishing in terms of technological-advancements, new methods for distribution of content (internet/intranet), reduction of print, paper and storage-costs, the ability to perform computer-based search, reusability of document-information, acceptance of online-reading, multimedia characteristics, self-publishing and storage-memory in libraries. The e-publishing works are presented using CDs, web-pages, laptop computers, PDAs, palmtop PCs, cell-phones with expanded displays, pocket-pagers and digital-reader devices.

2.4. E-book Issues

According to the survey report by Henke (2002a), e-book publishing was suggested in areas such as advertising, press releases and commercial reports. Renear and Golovchensky (2001) suggested the use of a content standard as an efficient publication model that provides for technological opportunities and constraints with e-book reading software. Such initiative on the e-book operation allows more functionality, inter-operability and access to all-reader.

Ormes (2001) also suggested that the e-book is being published on single or multiple file formats for the collection of e-book titles in the library. The integration of e-book formats poses many challenges. However, the benefits are that it allows for ease of

circulation, e-book loan with minimum costs, the digital certificates, Machine-Readable Cataloging (MARC) and Open Public Access Catalogue (OPAC) records.

NDIIPP (2002) also reported about the e-book model for competing technical standards: Digital Rights Management (DRM), e-book definitions and e-publishing methods. The study indicated the challenges for e-book issues such as dynamic preservation, technology, and standards as shown in Table 2.1.

Table 2.1 The challenges on e-book issues

No.	Challenges and Solutions
i.	*Dynamic preservation*: Storage media, format and encoding systems evolve. For example, the ordinary books are published in large number of copies. Similarly, the e-books can also be digitized in efficient, i.e. several thousand collections of titles are being published electronically. E-books technology is being utilized for viewing similar contents into different languages in the world**.** E-books could be downloaded on a floppy, CD, or other storage medium/device (Scheidlinger, Z., 2004).
ii.	*Technology*: In simpler terms, the page layout on the e-book display corresponds to that of the printed book. Scheidlinger (2004) also suggested that dimensions and weight of recent readers should be the same as the paperback. Schoch, Teoh and Kropman (2006) also applied the e-books and technological support for student's learning resources such as e-textbook or e-publications in universities. E-book Technologies Incorporated (2010), the e-book technologies included the four e-book products: e-book reading devices, the Online BookShelf, an Internet-based content sales and delivery system (the eBookstore), and eBook conversion/publication tools. It was a complete technology source for e-book reading devices and is effective for creating, distributing and controlling content. This enhanced the e-reading experiences. Paxhia and Trippe (2009) described the solutions about media and portability for e-book. E-books are implemented with powerful media contents such as video, analysis tools, algorithms and simulation experiments. There are various e-reader devices such as dedicated readers, hybrid computers/readers and Smartphones. Presently, laptop computers were utilized for carrying portable digital books and course material by students especially from universities/schools.

"Table 2-1. Continued"

No.	Challenges and Solutions
	According to Kozak (2003), professors and publishers encouraged e-textbooks. The cost of production (i.e. electronic versions rather than paper or other types of resources), shipping (i.e. via e-mail or internet), and physical costs (i.e. storage) are much lower than that for printed books.
iii.	*Screen*: The e-book display options include the size, resolution and portability. The screen display is described by the screen resolution as the number of pixels count horizontally and vertically, such as 800x600, 1024x768, or 1280 x1024 pixels. It requires the custom settings for layout and typography, e.g. margin, header, footer and font metrics. For example, Microsoft Reader with ClearType® (http://www.microsoft.com/reader) technology offered a fixed-length page layout and dimensions, high-quality resolution, and portable display features on screen.
iv.	*Standard*: The mark-up annotations, metadata, identifiers, software and hardware standard are the necessary features for content description. For example, the present e-book standard are such as HTML, Portable Document Format (PDF), open eBook (OEB), Digital Audio based information system (DAISY), TEI, NISO W3C, DocBook, MPEG, DOI foundation and ONIX metadata. Norshuhada, Landoni, Gibb, and Shahizan (2003) on the other hand suggested PDF, HTML, LIT, or RTF formats for implementing print publication such as novels, journals, newspapers, magazines, manuals and books with e-publication.
v.	*User Acceptance*: The basic principles of ordinary book publishing are being described similarly for e-publishing. Users are also attracted to open standards, e-book reading devices, on-demand print books, digitized text-books and modular content-publishing. For instance, Garrod (2001) described the factors on e-book acceptance such as the publisher's interests, market-demand, academic usage (e.g. short articles, storage, hypertext and journal publishing), reference materials and other non-fiction material. For example O'Reilly Media's Safari Books Online (http://my.safaribooksonline.com/?cid=orm-nav-global&portal=oreilly) offers such collection of e-book titles.
vi.	*E-publishing and Publisher*: The e-book publishers publish on commercial websites, e.g. Microsoft, Adobe Systems Incorporated and online e-bookstores such as Amazon.com, Barnes & Noble and Simon & Schuster. The e-book business opportunities are great, especially with the ubiquity of the internet where the publishing, selling and distributing of e-books can be done on commercial websites. The authors become e-publishers and e-publishers become e-booksellers, e.g. 1st Books (www.1stbook.com) or Artemis Books (www.artemisspress.com).
vii.	*E-book reader or digital Reader*: E-book reader or e-reader is an e-book device which provides portability, readability and longer battery power consumptions. This device utilizes standard file formats. Popular devices include the Barnes & Noble Nook, the Amazon Kindly, the Cybook Opus, the Sony Reader, the Gemstar Ebookwise, the Bebook, the Italica GmbH Paperback, the EGriver Touch and EGriver. Palm Pilots and Pocket PCs are also utilized as e-reading mediums using formats such as HTML. RTF, TXT, TRC and PDB. E-book manufactures

"Table 2-1. Continued"

No.	Challenges and Solutions
	are facing tremendous changes in the e-book industry and are working on product standards for publishing e-book, e.g. the copyright and security protections are considered by Microsoft Reader and Adobe Acrobat.
viii	*Print-On-Demand* (POD*)*: POD service facilitates the publisher with e-contents for ordinary publications. This service also increases the opportunities for sale of the book as they are requested. It allows the consumer to print titles from bookstore databases. For example, POD services are available from Xerox and IBM, University of Queensland (UQ) Bookstore and UQ POD Centre.
ix.	*Rights, Information security and Privacy*: Intellectual copyright of the digital information is secure by authentication between sender and receiver. The data integrity is being maintained in an original server. It is always being monitored with digital certification authorization. For instance, Guoyou (2001) studied about Digital Rights Model (DRM). The study suggested for DRM mechanism with the E-book Package Control (EPC) components: multiple objects, encryption, transmission, numbering and search, the digital content protection, secure distribution, authentications on content, transaction and identifying the market participants.
x.	*Cracking the code*: Cracking causes serious problems at present. It is the modification of programs to remove protection methods such as copy protection, trial/demo version, serial number, hardware key, date checks and CD/DVD software keys.
xi.	*From Books to E-books*: According to Norshuhada (2002), the e-book structure has the fundamental and essential principles of print book metaphor. E-book features include tagged structural markups, e.g., the elements of chapter, section, footnotes, header and sidebars, etc. and complex illustration of multimedia objects for science subjects. E-book has been recommended as the new medium of communication for printed book publication model. Lee and Boyle (2004) described e-book as analogous to a book.

2.5 Printed Book and E-book Publications

Norshuhada (2002) implemented the printed book metaphor for e-book structure representation. The term metaphor represents many of the characteristics features and properties of conventional book. Because of these considerations, an e-book has been classified into e-textbook, an electronic story book, an electronic encyclopedia, an

electronic article, and electronic magazine. Table 2.2 presents the comparisons between printed books and e-books.

Table 2.2 Comparison between the printed book and e-book publications

No.	Print book	E-book
i.	**Book history:** Historically, the production of paper books such as holy books was initiated by the Arabic communities during the eighth century. The modern print book publication was revolutionized with steam-powered printing presses since the 1800s. In very modern publishing industry, digital and laser printers are used for publishing high quality printed book publications.	**E-book history:** Project Gutenberg revolutionized modern e-publishing methods in 1971. E-book existed since 1989 when Frankin e-publishers had embedded e-dictionaries on e-book devices (Lynch, 2001). Science fiction (such as "The Hitchhiker's Guide") also existed in e-book format since 1979.
ii.	**Print book reading:** Eco (2003) described that books are read for the purpose of appreciating paintings, drawings, and popular printed images, as well as for educational teaching/learning, and novel reading.	**E-book reading:** E-reading, e.g. of encyclopedias, are consulted for brief information instead of for cover-to-cover reading (Eco, 2003; Brown, 2001). Henke (2002a) also reported that e-book consumers preferred e-book reading on computer screens.
iii.	**Static text and illustrations:** The printed text, pictures and illustrations on printed book publications are static.	**Multimedia elements:** Lombardi (2007) indicated that e-book is being featured with multimedia presentations such as text, image, sound and motion.
iv.	**Book library:** In terms of space, large areas were allocated to build libraries to house any type of printed records, publications, research collections. This results in the need for extra storage space, difficulties in management and searching the documents. According to a study by Fernandez (2003), the survey findings at University of North Carolina (UNCs) library reported on the difficulties associated with book publications in contrast to e-book publications. Survey instruments	**Digital library:** A large number of e-book titles could be stored and accessed with websites or e-bookstores at a time (Sottong, 2001). For example, Netlibrary provided millions of e-book titles to customers. Summerfield, Mandel and Kantor (2001) indicated that electronic file formats for the design of reference works allowed quicker browsing, reading and printing functions.

"Table 2-2. Continued"

No.	Print book	E-book
	included 10 different disciplines such as social science, literature, business/economic/management, medicines, computer, religion, arts, history, education and psychology.	
v.	**Physical appearance and use:** The book is paper-based, and produced in large quantities. It is easy to open and to start reading.	**Physical appearance and use:** E-book is a paperless, compact, simple and light-weight medium. However, it caused eye fatigue and required extra time for use on computers. Nevertheless, it is easy and fast to open, flip and browse the pages on e-books.
vi.	**Quality:** Webster and Pournelle (2007) described that printed book publication are in bound form and contains visual and tactile elements (layout and design, as well as look and feel).	**Quality:** Webster and Pournelle (2007) also described the e-book publications as technical, economical and convenient. For example, e-books could be loaded on next generation tools such as high-end mobile phones
vii.	**Layout:** The ordinary book has advantages such as typographical settings (word type), layout and polarization (black font with pure white background color).	**Layout:** E-book facilitates the design of the e-content: layout/margin, character type (Arial), size (Letter size) and the polarization (Lee, S. D., & Boyle, F., 2004).
viii.	**Features:** The book offers static features such as bookmarks, glossary, index and TOC. These pose some difficulty, e.g. in searching for a word/phrase and the lack of support for learning the contents.	**Features:** Mercieca (2004) recommended advance features for representing the e-contents such as annotations, bookmarks, multimedia and hypermedia. Abdullah and Gibb (2006) suggested that e-books should have special features such as search and dictionaries, hyperlink-based functions on TOC, indices, bookmarks and annotations. Simon (2001) suggested features such as glossary, dictionary look-ups, bookmarking, highlight and annotations.
ix.	**Packaging with copyright protection:** By default, it is assumed that the consumer would abide by copyright	**Packaging with copyright protection:** E-book contains technical mechanisms such as legal "Agreements" and DRM procedures to ensure secure publication

"Table 2-2. Continued"

No.	Print book	E-book
	laws.	(Association of American Publishers, 2000).

2.6 E-book Structure: Electronic Book On-Screen Interface (EBONI) Guideline

EBONI is an e-book principle design guidelines developed by an e-book working committee from University of Strathclyde in the United Kingdom (UK). It is proposed for contributing and sharing knowledge among users, developers, and researchers (Wilson & Landoni, 2002). Some of the efforts of the EBONI group are as follows:

i. Landoni, and Gibb (2000) indicated that e-books should contain book metaphor with advanced features such as hyper-texts, search engines and multimedia.

ii. Visual Book (Landoni, 1997) was designed for the translation of paper-book contents into e-book. It was based on the theory that it was possible and appropriate to identify and replicate logical structures of a document from its appearance.

iii. Norshuhada (2002) reported on the e-book conceptual representation model called Inter+Activity, also known as InterActivity that was implemented for the Malaysian Smart School environment. The study reported on innovative e-book features for children. The study also applied Gardner's seven multiple intelligences learning theory. Then, experiments to evaluate the InterActivity E-Book were conducted with school children. Based on the hypotheses, the results indicated that it was helpful for educational activities (as it is supported by Gardner's learning theory). Its builder functions were also found to be useful to school children and teachers since the