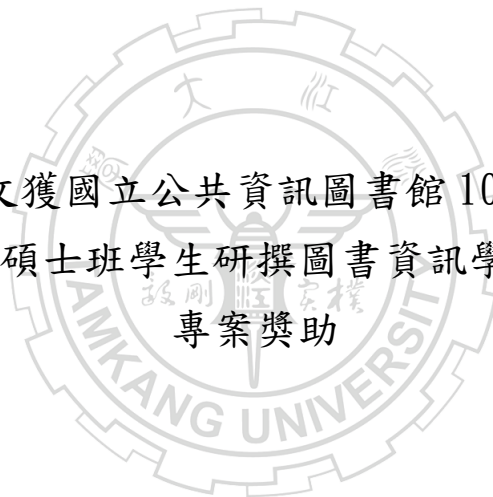# 淡江大學資訊與圖書館學系碩士班

碩士論文

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學術電子書平台可用性研究：以淡江大學為例

A Usability Study of Online E-book Platforms
in the Academic Library:
A Case Study of Tamkang University

研究生：江子隆 撰

中 華 民 國 102 年 6 月

謝辭

這裡沒有蕩氣迴腸的感文與唱名

僅哼以一段 感恩的心~感謝有你~

給所有無私予我愛與關懷的師長們、同學們、親友們、以及女友一位

謝謝您們

我是江子隆

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畢業時間及提要別：101 學年度第 2 學期　　　碩士學位論文提要

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論文提要內容：

　　本研究探討學術圖書館之電子書平台之可用性 (Usability)，以淡江大學覺生紀念圖書館為例，期望藉由研究結果來探究學術電子書平台應如何滿足學術使用者的需求，以提供更適切的閱讀介面。本研究以淡江大學研究生為對象，並藉由文獻研究之熱門程度及本校之使用頻率為平台選擇依據；選擇 EBSCOhost eBook Collection 和 SpringerLink E-Books 兩學術電子書平台作為研究標的。可用性之評估標準則是取自文獻探討中所歸納之 10 項指標功能及 Whitney Quesenbery (2003) 所提出之 5Es 作為基礎。透過分析深入訪談與可用性測試結果來歸納受測者使用偏好，再以網路問卷調查佐證，進而探討兩學術電子書平台之可用性以及使用者對於該類型平台之使用需求。研究最後，本文提出一套實際可行之學術電子書平台設計建議，其層面包括功能、圖示與介面設計，期望未來可供圖書館與供應商作為開發或採購之參考。

關鍵詞：可用性、電子書、學術電子書平台、圖示型標籤、文字型標籤、介面設計

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Abstract:

This research examines usability issues of e-book platforms in an academic library. Chueh-Sheng Memorial Library of Tamkang University is chosen as a testing environment of the study. By exploring and examining the usability of academic e-books platform from the user's point of view, this study aims to provide an interface that suits the user's liking based on the results of the study. In this research, representative graduate students with varied academic backgrounds are chosen as the testing participants; EBSCOhost eBook Collection and SpringerLink E-Books are selected based on the analysis of most-used platform in the school and the most-studied platform in the literature review. The criteria of usability evaluation are ten features summarized from the e-book related literature as well as and "5Es" that Whitney Quesenbery (2003) proposed. The researcher investigates user preferences through the usability testing and in-depth interviews; also an online survey is carried out as a method of triangulation. The results of the study reveal usability issues and user' demands on academic e-book platform. At last, this study proposes a practical recommendation for academic e-book platform. Also, suggestions for improvements, including icons designs, layout of an interface, and a complete template of simulated platform, are provided, which the researcher hopes can be used as a reference for e-book platform designers and for library practitioners when making purchasing decisions.

Outline

List of Table

List of Figures

1. Introduction

One of the most talked about IT terms after Kindle came on the market is probably "e-book," which is a form of digital file that makes reading books on an electronic device an option. With e-books, a lot of papers could be saved. The multimedia and interactions from e-books give users better experience that is very different from print books. E-books become increasingly popular for users of all ages; in addition, reading behaviors are also changed dramatically. According to the data from the International Digital Publishing Forum [IDPF] (2010), which showed the statistics of the e-book retail revenue in the United States, the third quarter of 2010 reached 119.7 Million. These statistics reveal the significant growth in recent years; it is no doubt that e-books are here to stay. However, this growth in popularity and demand also present many challenges to the sphere of library.

In recent years, readers have increasingly greater demands for e-books in libraries. Miller's (2011) experimental research on e-books in the Douglas County Libraries (DCL) in Colorado showed that the usage of e-books had a substantial growth in 2011 compared with that in 2011 as indicated in the bar chart in Figure 1, which demonstrated the changes of attitude and popularity in usage of DCL's readers towards e-books.
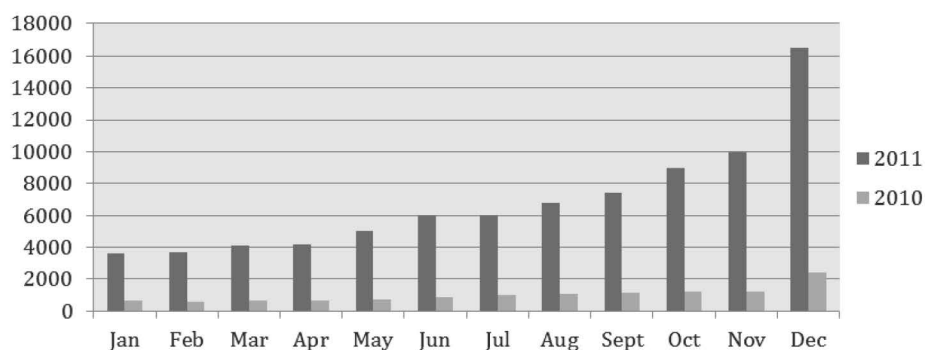
Figure 1.   Trends in e-book circulation at DCL

Note. From "The E-book Experiment," by M. Sendze, 2012, *Public Libraries*, *51*(1), p. 36. Copyright 2012 by the Public Library Association.

In response to the trend of e-books, the number of libraries around the world that purchase and offer e-book databases is growing each year. In Taiwan, according to Tsao's (2010) study, the average genres of e-books that offered clients in academic libraries dramatically increased from 2,146 in 2003 to 196,824 in 2008, which is more than 91 times growth within 6 years. In 2008, compared to a year ago, the average numbers of e-book purchases were 32,821, showing a growth rate of 57.74% (see Figure 2). The substantial increase in numbers means that the academic library not only pays more attention to the development of e-book collection but also has been allocating great amount of money on building e-books databases. In fact, in consideration of budget planning and meeting the needs of the reader, academic libraries would usually join consortiums to increase the types of e-book collections that can be used to achieve a cost-effective balance. Through purchasing databases together and sharing resources within the consortium, the cost is reduced.
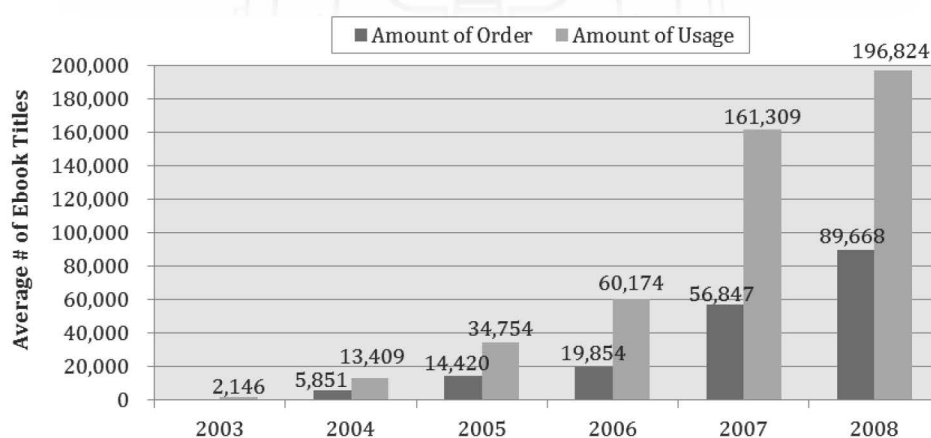
Figure 2.   Average amount of e-books of the college library collections
            in Taiwan.

Note. Adapted from Tsao, S. C. (2010). *The Impact of the Operation Model of Taiwan
     Academic E-books Consortium on Collection Development of University Librar-
     ies in Taiwan* (Unpublished graduate dissertation), (pp. 2). National Chung-Hsing
     University, Taichung, Taiwan.

Essentially, e-book designers need to work on devices that could display, flip, tag, take notes, and offer other reading functions. Among such the frequently seen devices as computers, laptops, cell phones, tablets, and e-book readers (e.g., Kindle, Nook, Sony reader), e-book readers are one of the most popular devices studied, and there is a great deal of literature on experimental studies of different brands and types of e-book readers, user behavior, and human-computer interaction (HCI). However, there are not many studies specifically targeting on the interface issue of e-books displayed on academic library websites or systems. According to Miller's (2011) research, in the academic library there were 72% participants reading e-books on the personal computers or laptops, and 62% reading via library computers, which is a lot more than on e-book readers (16%), and tablets (17%).

In light of the above concerns, the purpose of this study is to investigate and compare the role of online e-book platforms on the academic library website or system from the user's perspective. In other words, in this study we examine the usability of online e-book platforms in academic library. Chueh-Sheng Memorial Library of Tamkang University is the testing environment of the study. The followings are the research questions for the proposed study:

1) What is the user's preference and behavior of academic e-book platforms?
2) How is the usability of the e-book platforms in academic library?

The structure of the thesis is as followed. In this chapter, the background information for the proposed research questions is provided. Following the introduction is a review of the related literature. After that comes with research methodology with full details about the subjects, the testing environment, methods of data collection, and procedures. Chapter four describes the results of the data analyses. The last section, Chapter five, concludes the findings of the research and provides the suggestions on further research. Finally, it is hoped the results of this study could be beneficial for designers in e-book related industries.

Before proceeding with examining related literature, we need to define two important concepts in this research, the "e-books" and "e-book platforms."

3

"e-books"

Building on the existing literature, there are many e-book-related vocabularies, such as e-book, electronic book, digital book, e-book reader, e-reader, and other related terms. In principle, we can categorize the related concepts into two aspects, which are content and device. General public has mostly regarded the term "e-book" as the content of a book being made available in an electronic form (Hawkins, 2000), such as "mobi" and "epub," on the other hand, as a device, such as Kindle and Nook, for the purpose of reading electronic content. In addition, several readers may be accessing e-books without knowing that the resources they are using are actually e-books (Shelburne, 2009). In order to avoid confusion, the researcher adopts Magda Vassiliou and Jennifer Rowley's (2008) two-part definitions of e-book:

1) An e-book is a digital object with textual and/or other content, which arises as a result of integrating the familiar concept of a book with features that can be provided in an electronic environment.

2) E-books, typically have in-use features such as search and cross reference functions, hypertext links, bookmarks, annotations, highlights, multimedia objects and interactive tools.

The first part summarizes the essential and reasonably stable nature of e-books. And, the second part summarizes the current features of e-books. Also, there are two types of technologies available for using e-books: 1) online or internet-based; and 2) offline or specific e-book reader based (Anuradha & Usha, 2006). In this research, we focus on the first type, the online or the internet based.

"e-book platforms"

In this paper, the term "e-book platforms" refers to those websites can be read online e-books on the Internet, through browser. In the section of literature review (Chapter 2), this research summarized recent studies relating to e-book platforms and identified 14 scholarly research articles. Examining the literature, we can conclude that the most important five e-book platforms being frequently studied are:

4

1. EBSCOhost eBook Collection
2. ebrary
3. Gale Virtual Reference Library
4. MyiLibrary
5. SpringerLink E-Book

Additionally, scholars have explored the components of e-book platforms (summarized in Table 4, p. 15), and we list five examples as follows:

- Copy and paste
- Font resize
- Highlight
- Notes
- Page turn

Based on the literature described above, the researcher categorizes the e-book platform interface into two areas: reading area and feature area, as shown in the following figures (see Figure 3 for *EBSCOhost eBook Collection* and *SpringerLink E-book*).
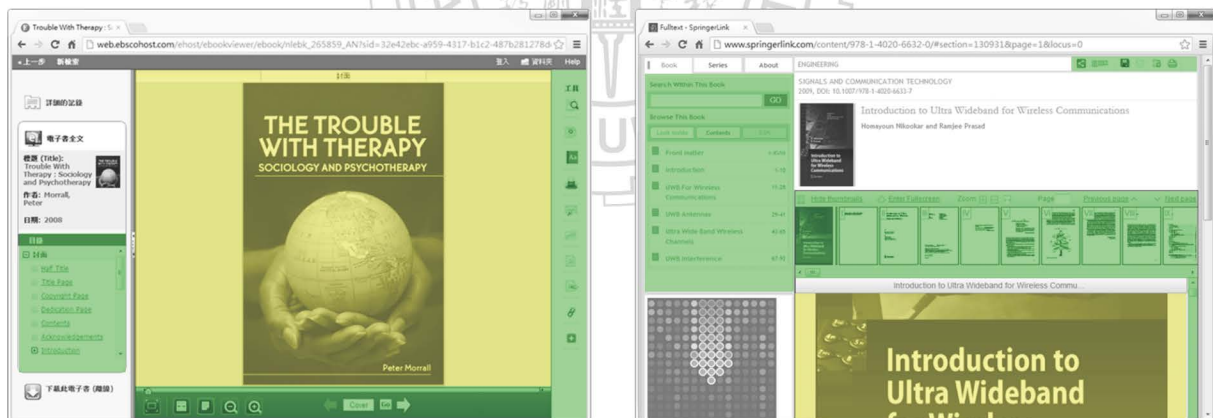
Figure 3.   Reading areas versus features areas on academic e-book platforms

Note. Reading area (yellow), features area (green).

EBSCOhost eBook Collection (left), *SpringerLink E-book* (right).

2. Literature Review

2.1. E-book Related Research

Examining the literature, it is found that a number of research had carried out to understand how people, in different countries and communities, use and perceive e-books. In the following paragraphs, we summarize research studies on user behaviors of e-book in academic libraries by countries, including United Kingdom, United State, Malaysia, South Africa, and India (see Table 1). The reasons for choosing these research studies are based on the importance and timeliness, which include two large-scaled surveys done between 2008 and 2009. The three chosen studies are carried out after 2011 in different countries to reflect recent developments. The overview of e-book related studies are organized into the following table and more details are given in the sections below.

Table 1

Overview of E-book Related Research

	Tucker	Zinn et al.	Letchumanan et al.	Shelburne	Jamali et al.	Nicholas et al.	Anuradha et al.
Year	2012	2011	2011	2009	2009	2008	2006
Country	U.S.	South Africa	Malaysia	U.S.	U.K.	U.K.	Indian
Institution	University of Nevada, Las Vegas	Library and Information Association of South Africa	Universiti Putra Malaysia	University of Illinois	120 universities	123 universities	Indian Institute of Science
Platform users	Student and faculty	Librarian	Student and faculty	Student and faculty	Student and faculty	Student and faculty	Researchers
Method	Content analysis	Interview	Interview	Interview	Questionnaire	Questionnaire	Questionnaire

United Kingdom

The National E-Books Observatory study, which is an online questionnaire survey carried out in U.K. provided extensive survey results of e-book usage and perceptions in more than 120 universities. During the period of data collection, 22,437 responses were received (Nicholas,

Rowlands, Clark, Huntington, Jamali, & Ollé, 2008). Moreover, they used two open-ended questions of the online survey questionnaire again in the following year and observed over 50,000 participants. Their respondents provided large numbers of comments in reply to the two questions: 1) *"In your opinion, what were the biggest advantages that e-books offered compared with a printed book? Please volunteer up to three reasons."* This elicited 11,624 responses and 11,763 advantages were mentioned; and 2) *"Is there anything that you want to add regarding course texts, print or electronic, or about your university library?"* There were 4,809 comments received for this question. These studies disclosed that e-book penetration is very strong and the convenience associated with online access along with searchability was the biggest advantage of e-books. Even that, the e-book has yet to become more student-friendly by improving features such as printing and screen-reading. (Jamali, Nicholas, & Rowlands, 2009).

United States

In the University of Illinois, approximately 47,000 respondents were contacted via campus e-mail with an invitation to their survey. Total numbers of 1,547 responses were received with a roughly 3% response rate (Shelburne, 2009). Also, in recent studies of e-book which is in 2012 by Tucker's survey assessing an e-book collection in an academic library at the University of Nevada, Las Vegas (UNLV). The study examined and reported the usage of *NetLibrary* and *ebrary*. Data were collected and analyzed from each vendor's website. The results showed that the acceptance of e-books has reached a level where they have become an important library service.

Other areas

In South Africa, Zinn and Langdown's (2011) research investigated the usage patterns of e-books among academic librarians in the workplace. Their survey questionnaire was distributed on the mailing list of Library and Information Association of South Africa (LIASA). The

questionnaire included closed-ended, partially closed, and open-ended questions. The results reflected a gradual trend towards e-book adoption. Nonetheless, there was still a preference for print or a "bit of both," i.e., having both print and electronic copies. In addition, Letchumanan and Rohani (2011) studied students' e-book user behavior with services offered by the library of Universiti Putra Malaysia (UPM) with an approach of interview. Gathered data were about the information on the user habits of e-book and perceptions of the e-book services. Furthermore, in India, Anuradha and Usha (2006) investigated the usage and usability of e-books from users' perspectives in an academic and research environment of Indian Institute of Science (IISc). The study used an e-mail survey on researchers in IISc regarding their use of e-books.

In the following sections, more detailed descriptions and analysis of the findings of the above mentioned studies are provided and are divided into three parts: 1) perceptions of the e-book; 2) use of the e-book; and 3) pros and cons of the e-book.

2.1.1. Perceptions of the E-book

Definitions of the e-book

Shelburne et al. (2009) noted that users may be accessing e-books without knowing that the resources they are using are actually e-books. Also, some users may not even be aware of any differences between an electronic journal (e-journal) and an electronic book (e-book). Anuradha et al. (2006) mentioned that only 56.4% respondents answered the question in which they were asked to define an e-book; that means about half of the participants could not define what he/she thinks an e-book is. Moreover, closed-ended questions, respondents were asked *"Do you think an e-book is not an e-book without the hardware and the book-like features-- such as turning pages and other book metaphors?"* and 24.7% of participants agreed with this statement whereas 29.7% disagreed and 45.5% failed to answer the question. Besides, the re-search of Zinn et al. (2011) showed that the respondents who are librarians were aware of what an e-book is. Their respondents provided various definitions of an e-book, such as *"digital*

copies of a book" and "*a book which is available on the internet or database.*" All the answers show a resemblance of definitions for an e-book found in the literature. These studies revealed that most respondents who were students and faculties are unable to define the e-book clearly, while librarians are the exception.

Experiences of using the e-book

According to the survey of Nicholas et al. (2008), more than 60% of the academic populations were already using e-books in the U.K, in which 69.3% were graduate students and 60.7% were undergraduate students. Shelburne's (2009) research suggested that 57% of users from the University of Illinois had experiences with e-books; among which 60% were faculty members, 60% were graduate students, and 55.5% were undergraduate students. Also, the study of Anuradha et al. (2006) showed that 86.7% of the respondents from Indian Institute of Science (IISc) used e-books before. As mentioned earlier, e-books have been accepted in the academic field. Researchers and scholars working in research institutions are most familiar with e-books, followed by faculty member, graduate students, and undergraduate students respectively.

Channels for accessing the e-book

Nicholas et al. (2008) noted that respectively 46% and 43% of respondents expressed they obtained the e-book from libraries and the Internet, which revealed that these channels are strongly preferred choices for accessing e-books. Furthermore, Zinn et al. (2011) showed that the two most popular ways of using e-books were from online databases in the library (60%) and from the Internet (60%). There are more and more users who have read e-books through the library, even more than from the Internet. However, in the University of Illinois, 45% of respondents (with 40% of faculty members, 47% of graduate students, and 39% of undergraduate students) stated that they were indeed unaware that e-books were offered by the library for their use (Shelburne et al., 2009). This means that although the e-book users of academic library are

increasing, there is still a lack of advocacy.

2.1.2. Use of the E-book

Time of reading the e-book

A finding of Nicholas et al. (2008) showed that 27.8% of students and 18.1% of faculty members said that their use of university library e-books went up in the month they participated in the survey study. Besides, according to the survey of Shelburne et al. (2009), it is noted that 30% of the participants used e-books monthly, 18% stated weekly, and 4% stated they use them daily. Moreover, 59% of the respondents indicated that they used reference e-books the most, research monographs the second, and textbooks are in the third place in terms of frequency. Regarding the amount of time spent on reading e-books, Zinn et al. (2011) indicated that 68% used less than ½ hour, 16% for one hour, 8% for 1 to 2 hours, and 4% for 3 to 4 hours. For the frequency of users reading e-books, the numbers showed a slight increase comparatively, but is still low.

Reading behavior of the e-book

Nicholas et al. (2008) noted that 54.7% respondents seem to dip in and out of e-books rather than reading them sequentially, which explained partially for the short reading sessions indicated in the research as users view only bite size chunks of e-books. Only 34% of students and 24% of faculty read at least one whole chapter. Just a tiny proportion of 5.8% said they read the whole book. In addition, Zinn et al. (2011) also mentioned that respondents either "dip in and out of several chapters" (56%) or "skim read the text" (32%). Based on the findings we find that users do not "purely" read an e-book. According to the survey of Shelburne et al. (2009), it showed that 78% participants read e-books for their research, 56% for study, 10% each for teaching and leisure, and 2% for other purposes. Besides, Letchumanan et al. (2011) suggested that most of their participants responded that they use the e-book for their research work more

than as course textbooks. For example, one postgraduate student responded that *"For me e-book is more suitable for research work…because it doesn't involve extended reading."* In other words, the e-book has been regarded as a kind of research tool for users of academic libraries.

Table 2

Respondents Use of E-books

	Zinn et al., 2011	Shelburne, 2009	Nicholas et al., 2008
Time of reading e-books	Length of time spent reading: - 68% less than 1/2hr - 16% 1hr	Frequency of reading e-books: - 30% monthly - 18% weekly	Went up in month they surveyed: - 27.8% students - 18.1% faculty
Reading Behavior of E-books	56% librarians dipped and out of several chapters. 32% librarians skim read the text.	--	Dipped and out of several chapters: - 54.3% students - 60.0% faculty

Other reading behavior of the e-book

In the research of Nicholas et al. (2008), it revealed that when respondents were asked, *"Where do you mostly access your university library online?"* there were a high proportion of 41.1% of students expressed they did so mostly from home. Nevertheless, 47% of faculty accessed the library mostly at the university. It appears that faculty and students exhibit very different preferences in regard to where they access the library online.

Letchumanan and Rohani (2011) studied the user's behavior of e-book service platform of Universiti Putra Malaysia. From their observation, the following series of reading habits were discovered:

1) People search for the e-book by entering the title or subject of the e-book;
2) Select the relevant e-book from the list of search results;
3) Read through the table of content of the e-book;
4) Select the relevant content from the table of content;
5) Scanned through the selected chapter and look for relevant materials; and
6) If the materials are relevant, either print the page or save it for future reference.

Moreover, the research noted that only one master's student and 10 undergraduate students preferred reading a whole e-book through the computer screen because they think it was a waste of papers for printing out the content. In addition, when these participants were asked about the comprehension level of the content, they stated that it took much time to understand the meaning of the text compared to reading the printed version of the book. Most participants said that they would print out the pages of the e-book if they find relevant content. According to these respondents, they found reading on screen tiring and prefer the printed version. Interestingly, however, compared with the findings in the U.K. the situations were opposite. The study of Nicholas et al. (2008) showed that most of the students (62.6%) and faculty (57.8%) read e-books directly from the screen. Only about 30 percent of participants preferred the printed.

2.1.3. Pros and Cons of E-book/Platforms

E-book

According to Jamali et al. (2009), Shelburne et al. (2009), and Zinn et al. (2011), they all examined the advantages of e-books from participants' responses in their studies (see Table 3). In the U.K., 6,169 of 11,763 (52.4%) respondents believed that "online access" was the biggest advantage and the "searchability" was the second, accounting for 13.2 percent. Clearly, e-books are more accessible than printed books, so users can read wherever they are and whenever they prefer (Jamali et al., 2009). In the University of Illinois, respondents pointed out the advantages of e-books were "instant access" (27%), "searchability" (25%), "convenience" (17%), and "portability" (15%) (Shelburne et al., 2009). Moreover, the research of Library and Information Association of South Africa also indicated the "searchability" of e-books is the most prized by respondents (Zinn et al., 2011).

The disadvantages of e-book were discussed in the literature (see Table 3). The three most common disadvantages described by the respondents were "screen-reading problem," "insuf-

ficient collection," and "printing problem." It appears from their research that users still prefer and try to print out the e-book, and also seems that the variety of subjects for e-books is still limited; they wanted more e-books to be available in their own subject area. Another disadvantage being criticized by far was difficulties of reading from the screen. Respondents revealed that reading through the "backlit screen" makes their eyes feel tired or that it was not suited to their ways of reading.

Table 3

Pros and Cons for E-book

	Zinn et al., 2011	Jamali et al., 2009	Shelburne, 2009
Pros for e-book	Searchability (76%)	Online access (52.4%)	Instant access (27%)
	Links (64%)	Searchability (13.2%)	Searchability (25%)
	Online access (56%)	Cost (10.8%)	Convenience (17%)
	Bookmarking (52%)	Portability (5.3%)	Portability (15%)
	Instant access (48%)	Convenience (2.9%)	Environmentally better (7%)
Cons for e-book	Printing problem (72%)	Collection Insufficient (13.1%)	Screen-reading problem (33%)
	Collection Insufficient (68%)	Screen-reading problem (7.6%)	DRM problem (14%)
	Cost (60%)	Access problem (1.8%)	Navigation problem (10%)
	Not subscribed (32%)	Printing problem (1.6%)	Technical problem (10%)
	Other (28%)	Saving problem (1.5%)	Materials & search problem (8%)

Note. Terminologies modified based on Jamali et al. (2009).

E-book platforms

This section evaluates the advantages and disadvantages of design features and technology-related aspects of the e-book platforms. In the Universiti Putra Malaysia, the research of Letchumanan et al. (2011) indicated the advantages of the e-book service offered by the UPM library. The participants in the study said that features such as 1) copy and paste; 2) the translation of text to mother tongue; 3) text shared with friends and; 4) page by page display creates a convenient platform for them to use the e-book. Also, specific areas that make their participants feel uncomfortable are the defects of the e-book platforms design, for instance: 1) looking like the scanned copy of the physical book; 2) black and white display; 3) only page by page

display, and 4) no adjustable font size feature. All these drawbacks make the e-book design more rigid. In addition, according to the research of Jamali et al. (2009), it suggested several technology-related problems of two e-book platforms, i.e., *ebrary* and *MyiLibrary*. The researchers noted a range of specific problems with the technology e-books use, which essentially involves the following issues: 1) the problem of browser support; 2) the problem of window resize; 3) unobvious page numbering; 4) fiddly reading format; 5) unsuitable interface; and 6) the problem of automatic logout. To be more specifically, the respondents indicated that *ebrary* a required specific browser and was not friendly to Linux and Firefox. Also, the inflexibility of browser choices makes it hard to resize and/or maximize the size of the window. Besides, respondents complained *MyiLibrary* for the much screen space being taken up by browser bars, status bars, controls on the left. Therefore, all left for the book is only a small space in the middle on the right-hand side. Moreover, *MyiLibrary* does not support more than about 15 pages' skim reading, because it thinks the user is trying to print out more than what the copyright allows, thus, would give warnings of logging out the user.

By examining the literature, we see that the participants in a wide range of e-book related research studies complain about the shortcomings of the platform. This also shows that users have increased their expectations of using the interface of e-book platform based on previous experience and perceptions. However, only limited research focuses on the interaction between users and the interface. For this reason and based on the related literature, we listed and categorized the important components (see Table 4) of an e-book platform, which is examined with a thorough inquiry from the perspective of user behavior on the e-book platforms in this thesis.

Table 4

Components of E-book Platforms

Categories	Components
Display-related	Colorful/Black and white
	Page by page
	Scan/Text
Feature-related	Copy and paste
	Font resize
	Highlight
	Notes
	Page turn
	Print
	Search
	Share
	Translate
	Window resize
Technology-related	Automatic logout
	Browser support
	Component layout

Note. Summarized from Letchumanan and Rohani (2011), Jamali et al. (2009), and O'Neill (2009).

2.2. Human-Computer Interaction

In recent years, because of the popularity of Apple's iPod, iPad, and iPhone, more and more people notice the importance of an "excellent interface design" and how such design impacts consumers' experience and choices, which also further reflects in the number of sales. Moreover, the trend of designing intuitive portable products indirectly influences the research orientation of the rapidly expanding field, Human-Computer Interaction (HCI). To give an example of HCI discussion, experts in the filed agreed that the "two pixels dead border" of Windows 95's start push-button is a fairly classic HCI example of failure (see Figure 4). Joel Spolsky's (2001) book analyzed that Windows 95's start push-button sits almost (but not exactly) on the bottom-left comer of the screen. In fact, it is about two pixels away from the bottom and two pixels away from the left of the screen. The principle of the mile-high menu bar

is fairly well known. Nevertheless, the team that designed Windows 95 missed the point completely, which resulted in customers' complaints, until Windows XP came along. This shows that the HCI is an exquisite field and a critical area that focuses on the interaction between human and the machine.
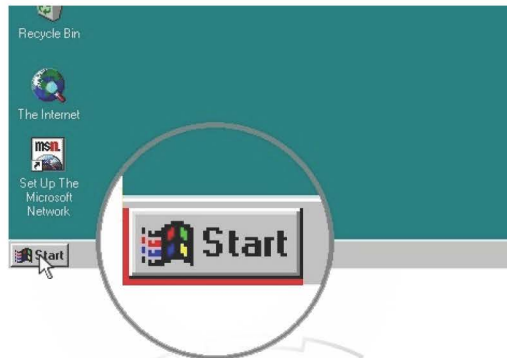
Figure 4. Two pixels dead border
with red marks

Note. Photo designed based on descriptions of
Spolsky (2001)

The early definitions of HCI can be traced back to Thomas T. Hewett, Bill Hefley, and the Special Interest Group of Computer & Human Interaction (1992). They offer a definition for HCI:

> *"Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them."*

Even to this day the above definition is still the most commonly accepted one (Peppa & Metaxas, 2012). Additionally, the book of Rajendra Kumar (2005) also defined HCI as the follows:

> *"Human-Computer Interaction (HCI) is the study and the practice of usability. It is about understanding and creating software and other technology that people will want to use, will be able to use, and will find effective when used."*

According to the research of Yvonne Rogers (2004), early theoretical developments in HCI can be classified into three main approaches: 1) applying basic research; 2) cognitive

modeling; and 3) diffusion of popular concepts. Besides, Hewett et al. (1992) considered five interrelated aspects of HCI and arranged the core areas of HCI into 16 groups (see Table 5).

Table 5

Content of HCI

N	**The Nature of HCI**	
	N1	(Meta-) Models of HCI
U	**Use and Context of Computers**	
	U1	Human Social Organization and Work
	U2	Application Areas
	U3	Human-Machine Fit and Adaptation
H	**Human Characteristics**	
	H1	Human Information Processing
	H2	Language, Communication, Interaction
	H3	Ergonomics
C	**Computer System and Interface Architecture**	
	C1	Input and Output Devices
	C2	Dialogue Techniques
	C3	Dialogue Genre
	C4	Computer Graphics
	C5	Dialogue Architecture
D	**Development Process**	
	D1	Design Approaches
	D2	Implementation Techniques
	D3	Evaluation Techniques
	D4	Example Systems and Case Studies

Note. From *Curricula for human-computer interaction* (pp. 14), by T. T. Hewett, B. Hefley, S. Card, T. Carey, J. Gasen, M. Mantei, G. Perlman, G. Strong, & W. Verplank, 1992, Curricula for human-computer interaction (pp. 14). New York, NY: ACM Press. Copyright 1992 by the ACM Press.

Moreover, the interrelationships among these topics were discussed and represented as in Figure 5:
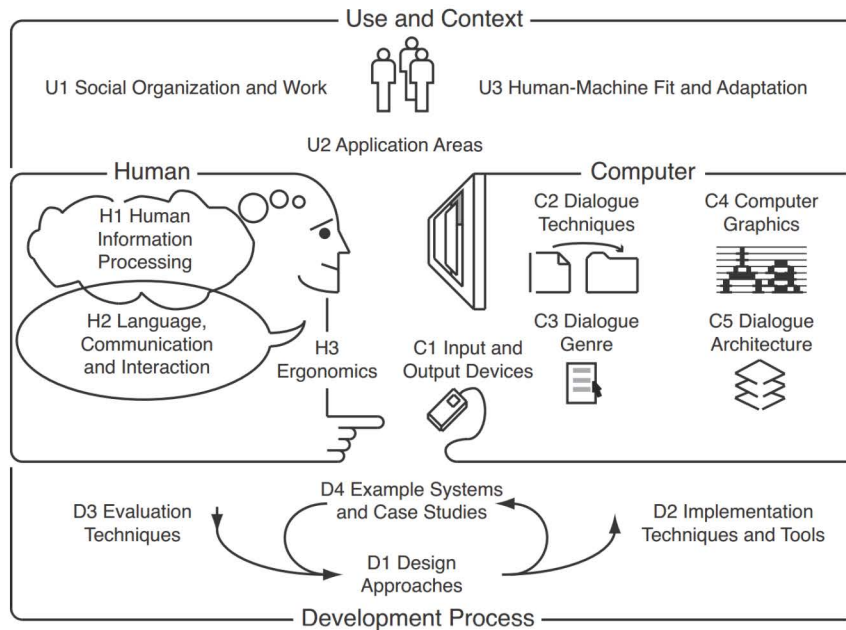
Figure 5. Human-Computer Interaction

Note. From *Curricula for human-computer interaction* (pp. 14), by T. T. Hewett,
B. Hefley, S. Card, T. Carey, J. Gasen, M. Mantei, G. Perlman, G. Strong,
& W. Verplank, 1992, Curricula for human-computer interaction (pp. 16).
New York, NY: ACM Press. Copyright 1992 by the ACM Press.

" • In addition to the use and social context of computers, on the human side we must also take into account the human information processing (H1);

• communication (H2); and

• physical (H3);

• characteristics of users. On the computer side, a variety of technologies have been developed for supporting interaction with humans: Input and output devices connect the human and the machine (C1);

• These are used in a number of techniques for organizing a dialogue (C2);

• These techniques are used in turn to implement larger design elements, such as the metaphor of the interface (C3);

• Getting deeper into the machine substrata supporting the dialogue, the dialogue may make extensive use of computer graphics techniques (C4)." (Hewett et al., 1992)

The researchers of HCI have accumulated a wealth of experience so far. Their contribution can be divided into three aspects: the principles, guidelines, and standards. Moreover, they

provides the principles, guidelines, and standards for the design and implementation of interactive systems, while the usability engineering offers all the methods, techniques, and tools for the evaluation of interactive systems (Peppa & Metaxas, 2012). The usability has been a fundamental concept for "interaction design" research and practice; it is a quality attribute that assesses how easy user interfaces are to use (Nielsen, 2003).

2.2.1. Usability

Usability is a core construct in Human-Computer Interaction (HCI). Methods to evaluating the usability of various software packages have been of intense interest to HCI researchers and practitioners alike. (Gray & Salzman, 1998) The International Organization for Standardization [ISO] (1998) proposed ISO 9241-11 that is the Guidance on Usability to be defined as:

>   *"Usability: the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."*

ISO 9241-11 explains how to identify the information that is necessary to take into account when specifying or evaluating usability in terms of measures of user performance and satisfaction. Guidance is given to the methods of describing the context of using the product as well as measuring the usability in an explicit way (Bevan, 2001). Furthermore, in order to respond to the usability of interface design, Donald A. Norman's (2002) book noted that the user-centered design should have the following characteristics:

>   *"Make it easy to determine what actions are possible at any moment (make use of constraints)."*

>   *"Make things visible, including the conceptual model of the system, the alternative actions, and the results of actions."*

>   *"Make it easy to evaluate the current state of the system."*

>   *"Follow natural mappings between intentions and the required actions; between actions and the resulting effect; and between the information that is visible and the interpretation of the system state."*

In other words, usability is to make sure that: 1) the user can figure out what to do; and 2) the user can tell what is going on (Norman, 2002). We provide an example to explain the importance of interface usability that essentially exemplifies a poor interface design causing the infamous Three Mile Island accident. Unit 2 (TMI-2) reactor of the nuclear generating station partially melted down on March 28th, 1979 as the result of the accident, which was the most serious accident in the U.S. commercial nuclear power plant operating history. The main cause was the oversights of human-computer interaction design. The accident happened because of the ambiguous control room indicators on the user interface of the control panel. In the following illustration (Figure 6) of the control panel of TMI-2, it shows that some tags covered one of the emergency indicator lights during the first 8 minutes when the accident happened, and a key indicator was also covered under the tag of the control panel and caused more than 100 alarms to go off. (U.S. President's Commission on the Accident at Three Mile Island & Kemeny, 1979)

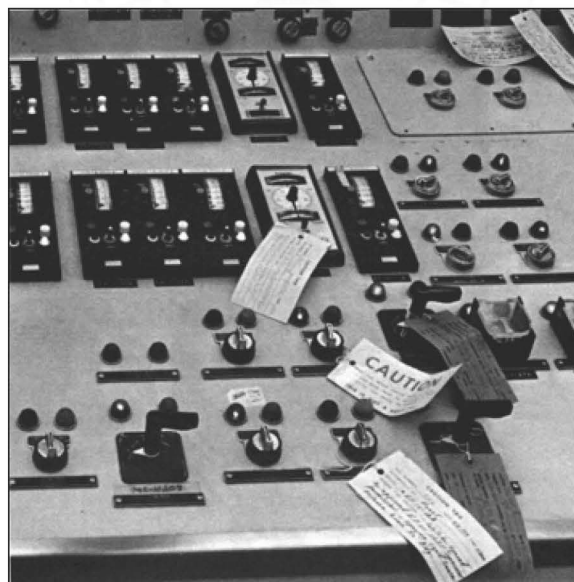*Figure 6.*   The TMI-2 control panel of Three Mile Island nuclear generating station

Note. From *The need for change, the legacy of TMI: report of the President's Commission on the Accident at Three Mile Island* (p.97), by U.S. President's Commission on the Accident at Three Mile Island & J. G. Kemeny, 1979, Washington, DC: U.S. Government Printing Office. Copyright 1979 by U.S. Government.

Components of usability evaluation methods

Usability is not a one-dimensional property of a user interface but has multiple components (Nielsen, 1993). In this section, the researcher summarizes five generic frameworks of user interface usability evaluation methods based on the existing literature.

a)   Questionnaire for User Interface Satisfaction (QUIS)

In the early stages, questionnaires have long been used to evaluate user interfaces (Root & Draper, 1983) and have also long been used in electronic format (Perlman, 1985). QUIS was proposed in 1988 by John P. Chin, Virginia A. Diehl, and Kent L. Norman (1988). It is a general user evaluation questionnaire for interactive computer systems. A total of 27 questions are designed in QUIS which can be divided into five components as:

- *Overall reaction to the software*
- *Screen*
- *Terminology and system information*
- *Learning*
- *System capabilities*

The purpose of QUIS questionnaire is to: 1) guide in the design or redesign process of systems; 2) give managers a tool for assessing potential areas of system improvement; 3) provide researchers with a validated instrument for conducting comparative evaluations; and 4) serve as a test instrument in usability labs (Chin et al., 1988).

b)   Nielsen's Attributes of Usability

Jakob Nielsen (1993) in his classic text considered five basic attributes of usability centered around users and tasks. The attributes are:

- *Learnability*
- *Efficiency*
- *Memorability*
- *Errors*
- *Satisfaction*

"Learnability" refers to that the system should be easy to learn so that the user can rapidly start getting some work done with the system. "Efficiency" means the system should be efficient to use, so that once the user has learned the system, a high level of productivity is possible. "Memorability" refers to that the system is easy to remember, so the casual user is able to return to the system without having to learn everything all over again if not using the system for some period of time. "Errors" refer to that the system should have a low error rate, so that users make few errors when using the system. If users do make errors, the system should be able to help them recover from the errors easily. Most important of all, catastrophic errors must not occur. "Satisfaction" refers to the system should be pleasant to use, so that users are subjectively satisfied when using it and can show positive emotions with the system (Nielsen, 1993).

c)   ISO 9241-11

ISO 9241-11 (1998) proposed three components to measure system usability in the context of using the system, which are:

- *Effectiveness*
- *Efficiency*
- *Satisfaction*

"Effectiveness" refers to how well the users achieve their goals using the system, including accuracy and completeness of users' tasks while using a system. "Efficiency" refers to users' level of performance in completing tasks. And, "Satisfaction" refers to users' subjective perception of a system in terms of comfort and acceptability.

However, Albers & Still (2011) criticized that the measurements left *effectiveness*, *efficiency*, and *satisfaction* undefined and open to interpretation as to what it means to achieve each criteria.

d)   USE Questionnaire

Arnold M. Lund (2001) argued a usability questionnaire should include the following four components:

- *Usefulness*
- *Ease of use*
- *Ease of learning*
- *Satisfaction*

This questionnaire has been used successfully by many companies around the world and in a number of dissertation projects (Lund, 2001). Compared to the former evaluation standards, the only different component of the USE Questionnaire is "Usefulness," which resembles similarity of ISO 9241-11's "Effectiveness."

e)   Quesenbery's 5Es

Quesenbery (2003b) raised three important criticisms of the definition ISO 9241-11 proposed and presented her attempt by defining the usability of a system as how well a person can use the system to accomplish his or her task (Albers & Still, 2011). The 5Es include:

- *Effective*
- *Efficient*
- *Engaging*
- *Error tolerant*
- *Easy to Learn*

"Effective" refers to the completeness and accuracy with which users achieve their goals. "Efficient" refers to the speed (with accuracy) with which this work can be done. "Engaging" refers to how pleasant, satisfying, or interesting an interface is to use. "Error Tolerant" refers to how well the product prevents errors and helps the user recover from any that do occur. "Easy to Learn" refers to how well the product supports both initial orientation and deeper learning (Quesenbery, 2003b). Quesenbery's use of the 5Es is unique in that she believes the five dimensions for website based design need to be applied based on different requirements. She disclosed:

> *"It would be convenient if each of the dimensions of usability was equally important in every product and for every user, as shown in Figure 1.* (see Figure 7) *They are not, however, and this provides one of the first opportunities to work with the 5Es to better understand the usability requirements for a product."* (Quesenbery, 2004)
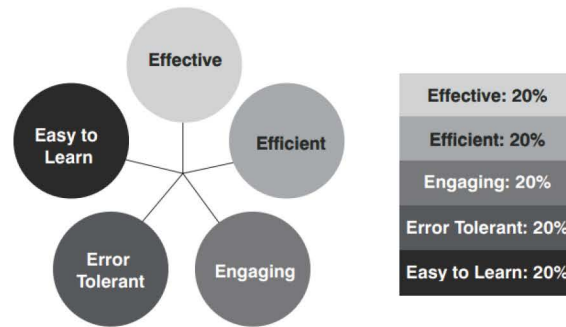
Figure 7.   In this case, the 5Es are evenly balanced

Note. From "Balancing the 5Es of Usability," by W. Quesenbery,

2004, *Cutter IT Journal*, *17*(2), p. 6. Copyright 2004 by the

Cutter Information LLC.

For example, her research stated two examples that show the radically different demands for

two websites (see Figure 8): a registration update form and a museum website, which are both

targeted for the use of the general public. (Quesenbery, 2003a)

Registration update form   *Museum website*
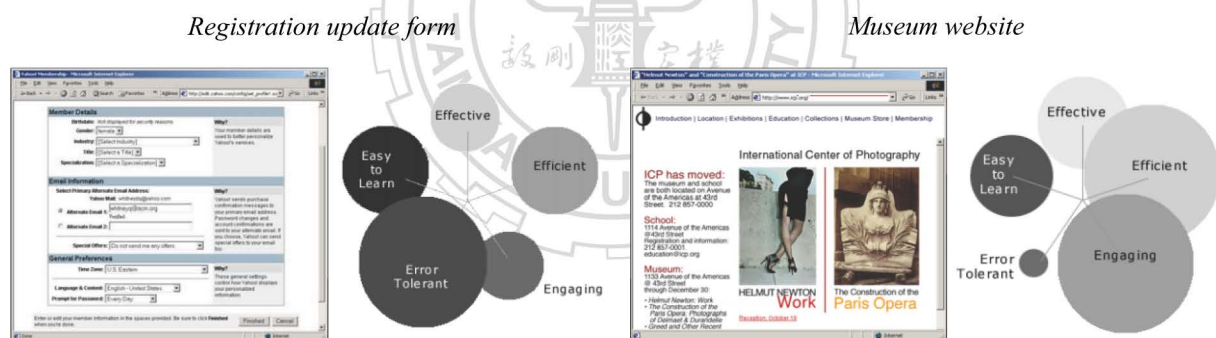
Figure 8.   Two websites applied with weighted 5Es

Note. Adapted from "Dimensions of Usability: Opening the Conversation, Driving the Process," by W. Quesen-

bery, 2003, *Usability Professionals' Association (UPA) 2003 Conference*, p. 5. Copyright 2003 by the User

Experience Professionals Association.

The value of Quesenbery's 5Es is for usability researchers to know how each of the di-

mensions of usability is defined. The way of doing this is to create first-person statements that

express a usability requirement for each dimension and draw a 5E diagram (see Figure 9) to

help identifying the good and weak components.

Figure 9.   Five Es diagram for an example

Note. From *Content and complexity: Information design in technical communication* (p.85), by W. Quesenbery, 2003, in M. J. Albers & B. Mazur (Eds.), Mahwah, NJ: Lawrence Erlbaum. Copyright 2003 by the Lawrence Erlbaum.
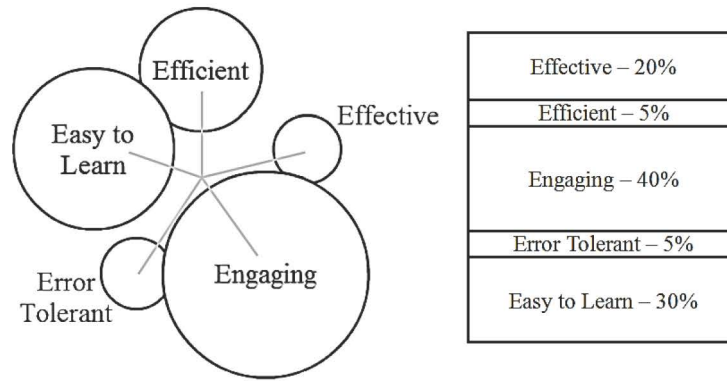
2.2.2. Similar Research Studies

According Albers and Still's (2011) book, there are many usability studies that address the interface problems of websites for online stores, company's official homepage, online catalogs, and other types of commercial websites so far (see Table 6). The table of analysis suggests that there are no website evaluations focusing on e-book platforms or studies deal with reading e-books from recent conference papers or journal articles. For this reason, the researcher searched in unpublished graduate dissertations and identified a highly relevant master's thesis by Laura C. O'Neill (2009) from the University of North Carolina at Chapel Hill in the United States. This research draws lessons from O'Neill's study and compares her results and findings in the conclusion section.

In O'Neill's (2009) study, there were ten participants (5 undergraduates and 5 graduates). Eight of the participants had used e-books before; five of these participants had experience using an e-textbook. She acknowledged that the sample size is small. But she did not specify whether these participants had used the e-book platform of her study subjects (*ebrary, MyiLibrary,* or *EBL books*). While she based on Nielsen's (1993) argument that 5 participants could

Table 6

Websites and Used in Usability Testing

Author	Website(s) Selected	Task
Guo & Poole (2009)	A bookshop	Participants selected, searched for, and bought books.
Kuan, Bock, & Vathanophas (2008)	Two online travel websites	Participants explored and bought travel packages.
Chua & Tan (2007)	A bookstore	Participants purchased books and gift cards.
Featherman, Valacich, & Wells (2006)	E-service websites	Participants investigated bill-paying-service websites and payment processing.
Green & Pearson (2006)	A department store	Participants searched for and bought an item.
Abdinnour-Helm et al. (2005)	A clothing store	Participants used the interactive component of the website to define and view outfits.
Massey, Khatri, & Ramesh (2005)	Two Web services for mobiles and PCs	Participants explored different Web services on mobile phones.
Singh, Dalal, & Spears (2005)	Twenty small business websites	Participants explored the Web pages.
Ethier & Hadaya (2004)	Four stores selling CDs	Participants shopped for one specified and one unspecified CD.
Kumar, Smith, & Bannerjee (2004)	Two bookshop web-sites	Participants created a new account and interacted with shopping carts.
Rosen, Purinton, & Lloyd (2004)	E-commerce websites	Participants searched for information.
Fiore & Iin (2003)	A clothing website	Participants explored mix-and-match functionality.
Teo, Oh, Liu, & Wei (2003)	Three online stores	Participants shopped for a new computer system.
Aladwani (2002)	A bookstore	Participants searched for and purchased a specified book.
Geissler, Zinkhan, & Watson (2001)	Commercial websites	Participants explored homepage complexity.
Roy, Dewit, & Aubert (2001)	A bookstore	Participants found and bought a book.
Vijayasarathy & Jones (2000)	A variety of stores with online catalogs	Participants bought a product of choice.
Zhang, Keeling, & Pavur (2000)	Ten Fortune 500 companies	Participants explored the homepages.
Nel, van N iekerk, Berthon, & Davies (1999)	Twenty different e-commerce web-sites	Participants evaluated the websites.

Note. From *Usability of complex information systems: Evaluation of user interaction* (pp. 163). M. J Albers, & B. Still, 2011, Boca Raton, FL: CRC Press. Copyright 2011 by the Taylor & Francis Group.

reveal about 80% of all usability problems in a product. A number of usability problems might be revealed, but it would be challenging to identify which problems are the most severe and deserve the highest priority of attention; thus miss out the problems that are fatal for novice users (Faulkner, 2003). Additionally, she did not explain the reasons for choosing the three platforms in the study, i.e., *ebrary*, *MyiLibrary*, and *EBL books*. Considering the fact that there are many e-book platforms, justification of the choices for the study is necessary. By examining previous research studies, the researcher of this study tries to carefully avoid the same problems and refines the methodology, which is described in the following chapter.

3. Methodology

A two-phase study is designed to explore the user's behavior and usability evaluation on the interface of e-book platforms provided by Chueh-Sheng Memorial Library at Tamkang University (TKU). To achieve the goal of triangulation and ensure comprehensive viewpoints, multiple data collection methods are applied to include multiple data sources. The methods used to carry out the study include questionnaires, usability testing, and in-depth interviews. The following sections discuss the details of implementation of these methods.

3.1. Participants

Approximately 27,000 students, including 20,153 undergraduate students, and 3,192 graduate students, were registered at TKU in year 2012. In order to meet the academic e-book platforms' users, the researcher deliberately chose graduate students as participants that contained doctoral student and master's student. According to the large-scale survey of Nicholas (2008), it is suggested that the postgraduates were the largest group with used e-books in the 123 UK universities. In addition, the method for recruiting participants for usability testing is mainly through the researcher's social network with an invitation to complete the survey. The number of usability testing participants is decided based on the students' distribution of each school at TKU. Table 7 characterizes the number of participants per school and the respective percentage in terms of the actual number needed for the research. In all, twelve individual volunteers were recruited for the research. The selected subjects all met the two basic criteria: 1) a graduate student status of Tamkang University; and 2) experience of reading e-books on certain devices least once. With regards to the survey questionnaire, the researcher distributed the questionnaire through social networks that are available to students at Tamkang University. Using the number of the lowest response of a particular school received as the base number, the researcher adjusted the number of responses received from other schools with a random selec-

tion so that the overall distribution of responses from all schools ultimately matched the ratio shown in Table 7.

Table 7

Number of Students and Participants Decided

Schools at TKU	No. of Students[a]	%	No. of Participants[b]
Engineering	853	26.72	3
Business and Management	739	23.15	3
International Studies	549	17.20	2
Liberal Arts	312	9.77	1
Foreign Languages and Literatures	288	9.02	1
Science	239	7.49	1
Education	212	6.64	1

Note. Summarized from Tamkang University students statistics (2012). *The number of students of each school at Tamkang University.* Retrieved May 7, 2012, from Tamkang University Website: http://english.acad.tku.edu.tw/statistic/edustacol.doc
[a]$n = 3,192.$ [b]$n = 12.$

Survey respondents and usability participants were divided into three groups (experts, intermediate users, and novices) that were used to compare in analysis. The classification was obtained through the Q5 to Q8 of questionnaire (see Appendix 1), the rules as follows:

A: Q5, choose [*I got it from TKU Library*]

$\cap$ Q6, choose one of $\left[\begin{array}{c} I\ read\ the\ contents\ from\ a\ screen \\ or\ A\ bit\ of\ both \end{array} \right]$

$\cap$ Q7, choose one of $\left[\begin{array}{c} I\ read\ the\ whole\ book \\ or\ I\ read\ several\ whole\ chapters \\ or\ I\ read\ one\ whole\ chapter \\ or\ I\ skim\ several\ chapters \end{array} \right]$

$\cap$ Q8, choose one of $\left[\begin{array}{c} highly\ dependent \\ or\ fairly\ dependent \end{array} \right]$ on *Library provided electronic resources*

B: Q5, choose [except *I don't remember*]

$\cap$ Q6, choose [except *I don't remember*]

$\cap$ Q7, choose [except *I don't remember*]

$\cap$ Q8, choose one of $\left[\begin{array}{c} highly\ dependent \\ or\ fairly\ dependent \end{array} \right]$ on *Library provided electronic resources*

C: All responses

According to the above rules, expert user was *"A"* as the representative, intermediate user was *"B − A"*, and novice was *"C − A ∪ B"*. Figure 10 shown in detail:
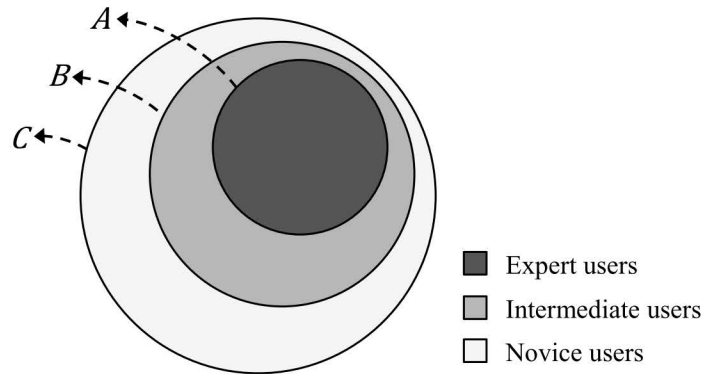

Figure 10.   Method of online respondents classification

Note. The circle of *A*, *B*, and *C* please refer to previously described.

3.2.   Platforms

A considerable number of electronic resources are provided by TKU, which includes e-papers, e-journals, and e-books. The e-books' vendor could be divided into publishers and aggregators (Silberer & Bass, 2007; Vasileiou et al., 2011; Zinn et al., 2011). Since the definition of e-book platform is still not very clear based on the review of the literature and considering the comprehensiveness of e-book platforms, this study collected and organized platform vendors from e-book related literature. Based on the analysis of e-book vendors (see Table 8), the researcher chose the most frequently studied platform, i.e., *EBSCOhost eBook Collection* to include in the research. On the other hand, the researcher also investigated and summarized the usage statistics of e-book platforms of electronic resource on the Tamkang University Library website (see Table 9). Based on the result we came up with most used platforms, i.e., *EBSCOhost eBook Collection*. Because *EBSCOhost eBook Collection* showed up both times in the analysis, we moved the selection of choice to second platforms listed in Table 9. As the result, the two platforms chosen for this study are *EBSCOhost eBook Collection* and *SpringerLink E-Books*.

Table 8

E-book Platforms in the Literatures

Platforms	Tucker (2012)	Letchumanan et al. (2011)	Zinn et al. (2011)	Nicholas et al. (2009)	Jamali et al. (2009)	Shelburne (2009)	Silberer et al. (2007)	Anuradha et al. (2006)	Total
EBSCOhost (NetLibrary)	×	×	×	×	×	×	×	×	8
ebrary	×	--	×	×	×	×	×	×	7
Gale Virtual Reference Library	--	×	×	--	--	×	×	×	5
MyiLibrary	--	--	--	×	×	×	×	--	4
SpringerLink E-Book	--	--	--	--	--	×	×	×	3
Safari Books Online	--	--	×	--	--	×	×	--	3
Wiley InterScience Online Books	--	--	--	×	--	×	×	--	3
Kluwer	--	--	--	×	×	--	--	×	3
Elsevier	×	--	--	--	--	--	×	--	2
Ebook Library (EBL)	--	--	×	--	--	--	×	--	2
Cambridge University Press	--	--	×	--	--	--	×	--	2
Knovel	--	×	--	--	--	--	--	--	1
Questia	--	--	--	×	--	--	--	--	1
Emerald	--	--	--	--	--	--	×	--	1
Books 24x7	--	--	--	--	--	--	×	--	1
Oxford University Press (OUP)	--	--	--	--	--	--	×	--	1
Taylor & Francis	--	--	--	--	--	--	×	--	1
Books@Ovid	--	--	--	--	--	--	--	×	1
Engineering Village	--	--	--	--	--	--	--	×	1

Table 9

Usage Statistics of E-book Platforms at TKU

Platforms	Searches (month avg.)	Sessions (month avg.)
EBSCOhost eBook Collection	1,199.0	943.7
SpringerLink E-Books	--	860.0
McGraw-Hill Education	32.7	189.0
Emerald eBook Series	--	150.8
Columbia University Press eBook	21.0	122.3
MyiLibrary	19.9	120.8
Engineering Village	355.5	96.1
RSC Publishing	--	73.4
ebrary	162.2	47.8
Cambridge Books Online (CBO)	15.7	47.1
Library & Book (L&B)	13.4	37.4
American Library Association (ALA) eBooks	30.1	24.4
ABC-CLIO eBook Collection	0.5	23.7
Oxford University Press (OUP)	21.2	22.3
Palgrave Connect eBooks	11.1	17.1
Books@Ovid	12.2	15.6
Gale Virtual Reference Library	24.0	12.6
BEP eBook collection	1.8	11.4
IOS Press Books Online	--	7.9
Taylor & Francis	9.1	5.4
The Online Books Page	--	2.9
Questia	--	2.4
World eBook Fair	--	1.4

Note. Summarized from Tamkang University Chueh-Sheng Memorial Library statistics Information (2012). *Usage of western language electronic resource.* Retrieved May 15, 2012, from Tamkang University Chueh-Sheng Memorial Library Web site: http://info.lib.tku.edu.tw/statistics/

3.3. Data Collection

This research consists of two sections: online survey and usability testing (see Figure 11). The two methods of data collection were carried out separately but during the same period of time. For implementation of online questionnaires, the on-line survey tool, *Google Forms*, was

used. The researcher designed a website that has the online questionnaire embedded in this site (see Appendix 2). Also, in order to allow respondents to recall their reading experience on e-book platforms and to answer the questions correctly, this research provided two videos that are reading action recording of each e-book platform. For the purpose of usability testing, *Camntasia Studio 7* was used. It is a type of software for desktop action recording. Screen movements, mouse movements, and participants' voice can be captured and recorded into a video clip.
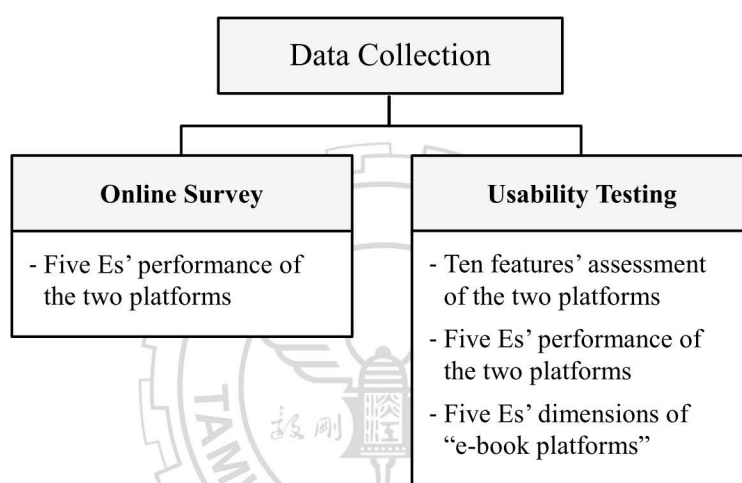
Figure 11. Data collection of methods

Online Survey

The online questionnaire has three sections (see Appendix 1), the first of which is intended to elicit demographic information of the respondents. The second section focuses on attitude regarding the respondents' reading e-books at Tamkang University Library. Modifying from Nicholas et al. (2008), whose study contained 55 closed questions for e-book behavior topic, we pick the 5 relevant questions from their survey, which are no.2, no.3, no.4, no.14, and no.17. Last, the third section focuses on the usability issue of e-book platforms, including *EBSCOhost eBook Collection* and *SpringerLink E-Books* that are available from the website of Tamkang University Library.

In part 3, the questions are based on the components of usability evaluation method, which is Quesenbery's 5Es. The researcher also references to Gary Perlman's (2011) "User Interface Usability Evaluation with Web-Based Questionnaires." It is a web-based user interface evaluation with questionnaires that has online script and nine standard user interface evaluation questionnaire forms, including Nielsen's (1993) Attributes of Usability. Perlman (2011) was able to convert the five attributes (5Es) into the questionnaire; therefore, this research took the similar approach and designed the usability evaluation questionnaire.

Usability Testing

Prior to the usability testing and in-depth interviews, all participants were provided with an opportunity to examine and sign a consent form (see Appendix 3) with information such as the purpose of the study, procedures, and benefits of this research. They could decide whether or not to participate and were promised with the right to withdraw. After confirmed with the intention of working with the researcher, the participants were asked to perform a series of tasks for the two e-book platforms in the testing laboratory (see Figure 12). In order to protect their privacy, all participants were afforded anonymity and confidentiality of the data. Furthermore, for the testing environment, we provide IE, Firefox, Chrome, and Safari. They are chosen because of the survey of web browser market share by Ken Corley and Scott Hunsinger (2012). To reduce the impact of a learning effect as participants completing the tasks on each platform, the researcher varied the order in which participants test the platforms, and at the end of these tasks, the in-depth interviews were being conducted.

Testing tasks of this study are modified from O'Neill (2009) as follows:

1) Choose and open your usual browser (IE, Firefox, Chrome, or Safari), and link to the e-book platform. (The researcher will give instruction as to which e-book platform to use.)

2) Search an e-book collection for a term that is matching your field. From the list of search results, choose an e-book and read several pages.

3) Look at the feature of the e-book platform and try to use them.

- Copy and paste
- Font resize
- Highlight
- Notes
- Page turn
- Print (page of the e-book)
- Search (content of the e-book)
- Share
- Translate
- Window resize

CPU: Intel Core i5-2500
RAM: Transcend 4GB
LCD: Philips 17"
OS: Windows 7
Browser: IE, Chrome,
Firefox, Safari

Figure 12. Testing environment

Note. Meeting room *#L502*, Liberal Arts of TKU

Finally, the 5Es is the overall and main basis for the assessment of the research. The researcher analyzed the data collected from the online questionnaires in one hand, while also collecting the interview comments in the other hand to evaluate the 5Es' performance of the two platforms, thus representing the above rule with the flow chart shown as Figure 13. The researcher via in-depth interviews and think-aloud method collect subjects' responses and explore the specific context of each platform and each subject persona. Moreover, this research follows Quesenbery's (2003) process to carry out in-depth interviews and directly assess the

subjects' responses, in order to assess the 5Es dimensions of all "e-book platforms" website. The process is as follows:

" 1) *Discuss the meaning of each of the 5E to be sure that everyone understands them and how they might be understood in the context of your project.*

2) *Identify (or create) typical user statements that express their attitudes towards each of the dimensions. You can do this for the primary persona, or for several personas or user groups.*

3) *Discuss the relative importance of each of the dimensions to the success (and overall usability) of the product, noting the reasons for how the priorities are set."*

(Quesenbery, 2003a)
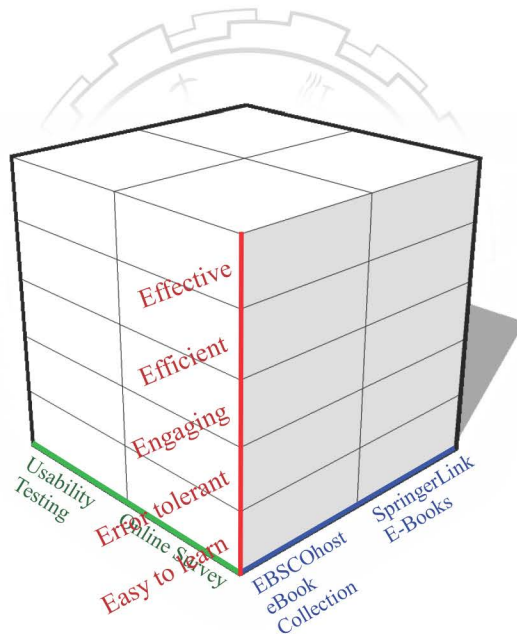
Figure 13. Two methods to obtain the 5Es'
performance of two platforms

4. Research Results

The results of the study could be divided into three categories also that is also the order of this chapter:

1) Ten Features for assessing the two platforms by usability testing. For the ease of reading, platforms *EBSCOhost eBook Collection* and *SpringerLink E-Books* are hereinafter referred to as *"EB"* and *"SP"*;

2) Five Es for evaluating the performance of the two platforms by conducting usability testing, in-depth interviews, and online survey;

3) Estimating the 5Es dimensions of the "e-book platforms" by in-depth interviews, "e-book platforms."

The demographical information (see Table 10) of the participants is as follows: 7 male and 5 female accounted for about 58% and 42% respectively. Approximately 67% (8/12) used Google Chrome browser, Internet Explorer accounted for about 33% (4/12), and nobody used the other browsers (Firefox and Safari). In addition, the levels of participants were relatively distributed across *expert user* 25% (3/12), *intermediate user* 33% (4/12), and *novice user* 42%

Table 10

Participants' Demographical Information

ID	Sex	Level	Browser	Testing sequence	School
E1	Male	Expert	Google Chrome	$EB \rightarrow SP$	Engineering
E2	Male	Expert	Google Chrome	$SP \rightarrow EB$	Engineering
E3	Male	Expert	Google Chrome	$EB \rightarrow SP$	Business and Management
I1	Female	Intermediate	Google Chrome	$SP \rightarrow EB$	Global Entrepreneurial Development
I2	Female	Intermediate	Google Chrome	$EB \rightarrow SP$	Liberal Arts
I3	Male	Intermediate	Internet Explorer	$SP \rightarrow EB$	Science
I4	Female	Intermediate	Internet Explorer	$EB \rightarrow SP$	Education
N1	Male	Novice	Google Chrome	$SP \rightarrow EB$	Engineering
N2	Male	Novice	Google Chrome	$EB \rightarrow SP$	Business and Management
N3	Female	Novice	Internet Explorer	$SP \rightarrow EB$	Business and Management
N4	Female	Novice	Google Chrome	$EB \rightarrow SP$	Liberal Arts
N5	Male	Novice	Internet Explorer	$SP \rightarrow EB$	Foreign languages and Literatures

(5/12). However, in this research, the novice users are referred to those who have infrequent uses of an e-book platform. In other words, all participants or respondents must have used these e-book platforms at least once. The purpose is to avoid the problem suggested by Faulkner (2003), who stated that it is a fatal issue to include those who have no experience in the testing category for novice users. The testing task sequence and the distribution of the schools were determined by the researcher in order to make the participants were allocated as equitably as possible. The difference of participants' level and platforms used were the focus of this research. Therefore, the researcher adopted the initial of name of user's level to be used as the beginning word of participant's ID. For example, the participant E1 is an Expert (initial E), and N5 is a Novice (initial N), but the number of second word does not have any significance.

4.1. The Assessment of Ten Features

Through analyzing the data collected in the first part of usability testing and in-depth interviews with the 12 participants, the researcher identified three categories of the 10 key features; the classes were divided into *necessary*, *secondary*, and *unnecessary*. The definitions are described in Table 11.

Table 11

Classification and Definition of 10 Features by Importance

Group	Definition	Features
Necessary features	Important and indispensable features. Performance of feature design has a great influence on participants; it's also vital component of e-book platforms and all participants agreed that.	• Page turn • Window resize • Search • Copy and paste
Secondary features	Relatively unimportant features. Participants would probably feel better when they saw these features, nonetheless they would not be upset if without. To put it simply, *"It's better than nothing."* (I4)	• Notes • Highlight • Translate • Print • Font resize
Unnecessary features	Everyone think it is totally unimportant and dispensable features, participants almost never use them; even without this feature will not have any impact.	• Share

In the following sections, we assessed the 10 features of *EB* and *SP* based on the results of usability testing and discussed based on the above three classification. In order to compare the icons and layouts, we captured a picture of feature comparisons as shown in Figure 14 and 15.
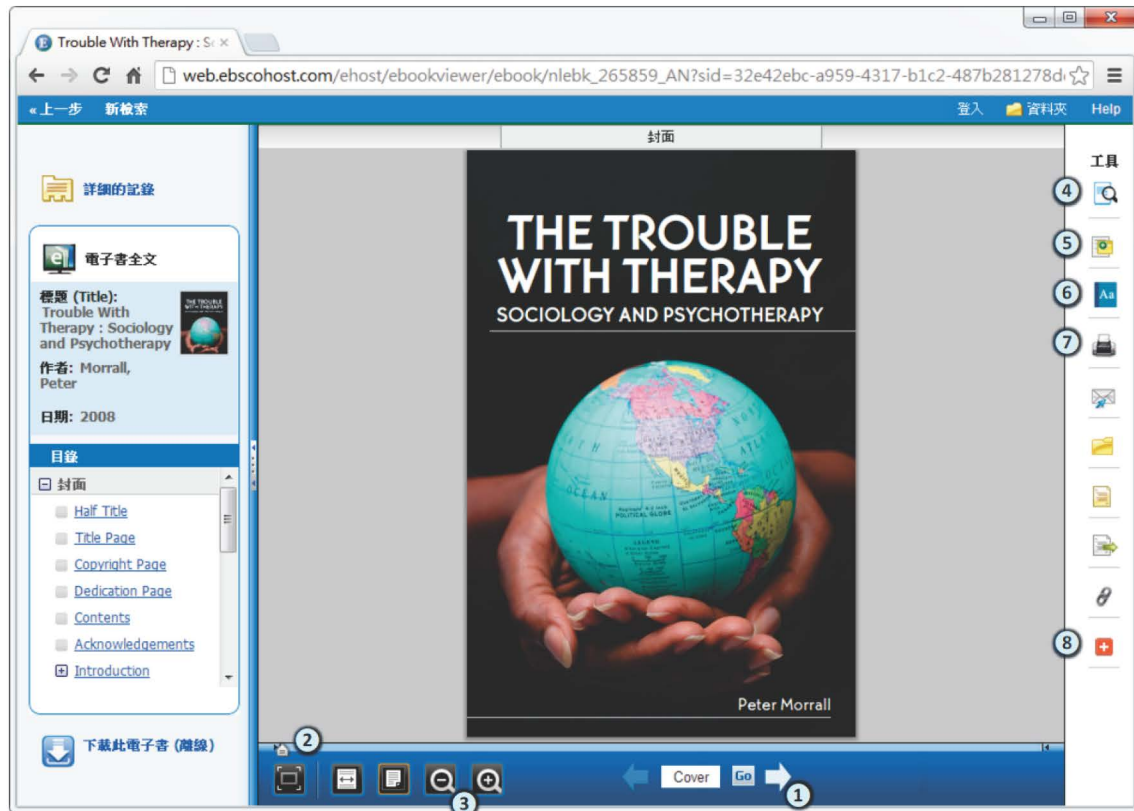

Figure 14.   Feature comparisons on *EB*

Note: ① Page turn (i) - arrow button

② Page turn (ii) - scroll bar

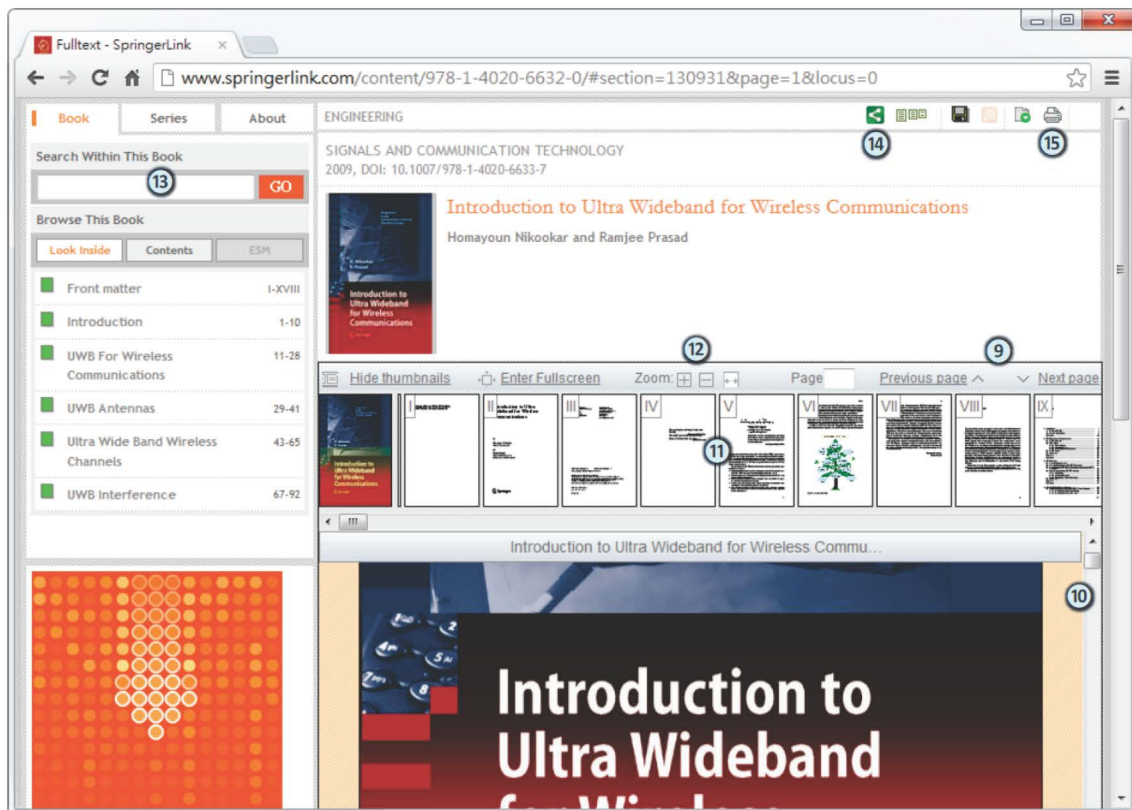③ Window resize

④ Search

⑤ Notes

⑥ Dictionary

⑦ Print

⑧ Share

Figure 15.   Feature comparisons on *SP*

Note: ⑨ Page turn (i) - text button

⑩ Page turn (ii) - scroll bar

⑪ Page turn (iii) - page thumbnails

⑫ Window resize

⑬ Search

⑭ Share

⑮ Print

4.1.1.   Necessary Features

Page turn

This is the feature most commonly used on e-book platforms. All participants were able to complete the task quickly. There were not a lot of differences of performance for different levels of participants on testing result (see Table 12). However, the testing speed of expert users on *SP* was faster than on *EB*. The way "page turn" works on *EB* was by reloading each page. On the other hand, *SP* works entirely different, thus, can save more time than *EB*.

Table 12

Time Spent and Success Rate on "Page turn"

Participants	EB		SP	
	Time spend	Success rate	Time spend	Success rate
Expert users	3.0 sec	100 %	1.0 sec	100 %
Intermediate users	3.8 sec	100 %	3.0 sec	100 %
Novice users	3.2 sec	100 %	3.8 sec	100 %
Summary	3.3 sec	100 %	2.8 sec	100 %

Note. Summarized from Appendix 4

The research finding showed that 83% (10/12) of the participants preferred the page-flipping that does not reload when they clicked on the next page, which is how "page turn" feature works on *SP*. *EB* has two ways to flip pages, which are "arrow button" and "scroll bar" (see Figure 16, ① and ②). Meanwhile, *SP* has three ways, including "text button," "scroll bar," and "page thumbnails" (see Figure 16, ⑨, ⑩, and ⑪). In other words, there are a total of 5 features in these platforms. The results of usability testing showed that *EB*'s "arrow button" and *SP*'s "page thumbnails" were significantly superior to those other three designs. The participants revealed that they were intuitive and easy to understand.

> *"I usually don't like the design of continuous page turning, because I can't find the page number sometimes; however, I think it is amazing that SpringerLink merges page thumbnails and continuous page turning into their platform. The preview function above the page also displays the reading block. I can quickly flip and avoid losing page numbers. I really like that ..."* (E2)

> *"I like SpringerLink's page flipping, EBSCO's arrow icon, and I think that preview is very important for turning pages in the e-book platforms. For example, the feature 'page thumbnails' of SpringerLink is pretty good ..."* (I3)

> *"I like EBSCO's flipping arrow, but I also like SpringerLink's 'page thumbnails' that allows me see a picture or text about the appearance of the next page. If they can merge two features into one, that will be better..."* (N3)

Page turn on *EBSCOhost eBook Collection*: ①, ②
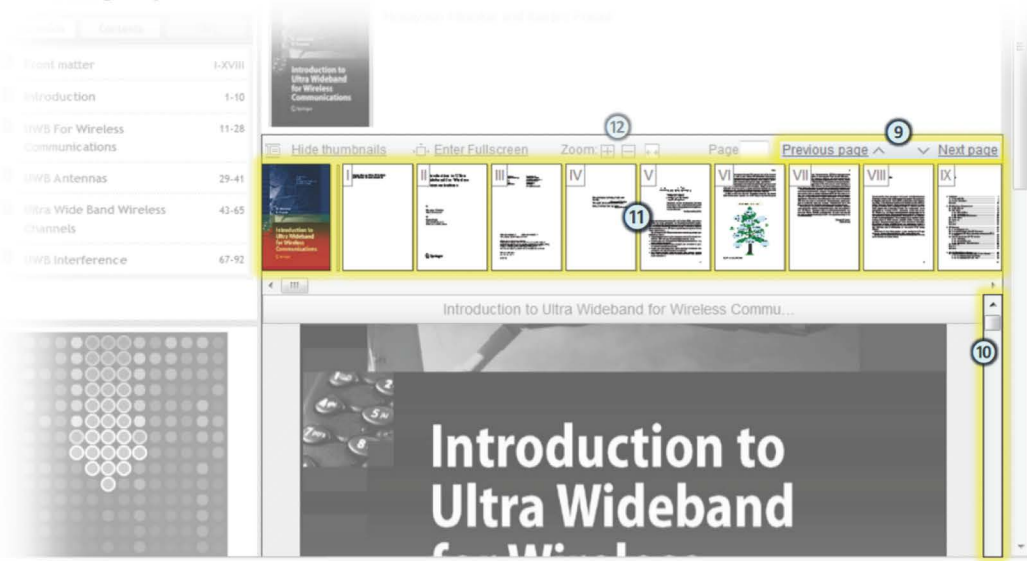

Page turn on *SpringerLink E-Books*: ⑨, ⑩, ⑪

Figure 16. "Page turn" on *EB & SP*

Note. The whole screen shot can be found in Figure 14 and 15 (p. 39 - 40).

Window resize

All participants believe this is an important feature. As E1 stated: *"The fonts of most academic books are rather small; thus, reading through the computer screen can be difficult."* Additionally, there were some discrepancies between the testing results of two platforms. As shown in Table 13, the participants on each level all spent more time on *SP* than *EB*, since the "window resize" icon of *SP* was a small and light-colored button (see Figure 17). Many participants browsed the website page up and down as well as back and forth to look for this feature. As the experience level of participants decreased, this problem seemed to be more serious.

Table 13

Time Spent and Success Rate on "Window Resize"

Participants	EB		SP	
	Time spend	Success rate	Time spend	Success rate
Expert users	4.3 sec	100 %	10.7 sec	100 %
Intermediate users	6.8 sec	100 %	12.8 sec	100 %
Novice users	5.3 sec	80.0%	14.5 sec	80.0%
Summary	5.5 sec	91.7%	12.6 sec	91.7 %

Note. Summarized from Appendix 4

Window resize on *EBSCOhost eBook Collection*: ③
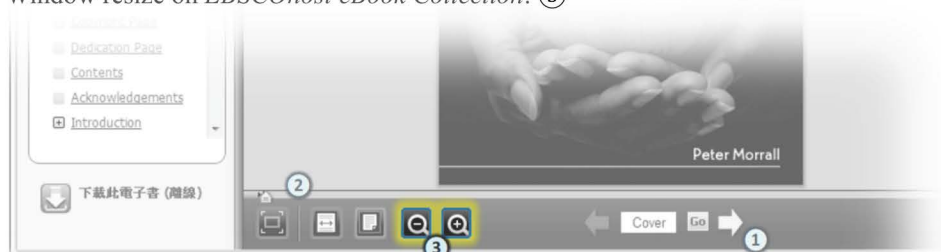
Window resize on *SpringerLink E-Books*: ⑫
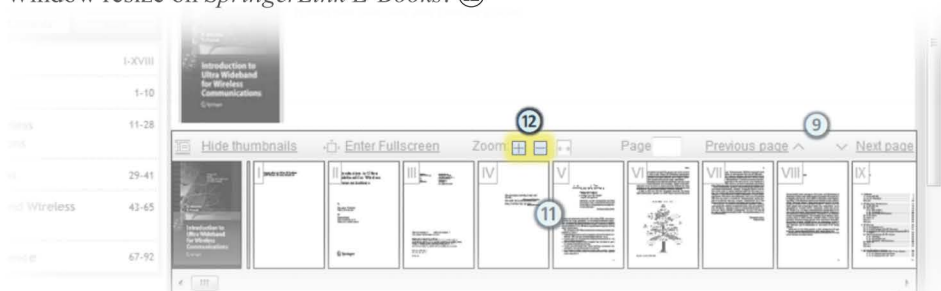
Figure 17. "Window resize" on *EB & SP*

Note. The whole screen shot can be found in Figure 14 and 15 (p. 39 - 40).

Furthermore, a problem pointed out by the participants was the zoom function. The *SP*'s resize feature only has one dimension to zoom in and out, which participants criticized a lot. For example:

> *"SpringerLink's zoom buttons are too small. The button is also too far away from the reading panel. In fact, the buttons would be cut off and be moved outside of the screen when use the scroll wheel to scroll down the webpage (see Figure 18) ..."* (E3)

The results showed that the magnifier button of *EB* is obviously better than *SP*, such as N5 said: *"EBSCOhost's icon is relatively large, thus relatively easy to find."* Also, I3 described the difficulty on *SP*:

> *"We have been trained from past experience and are used to decipher graphical icons easily, so for SpringerLink's text-only buttons, I have trouble locating them."* (I3)
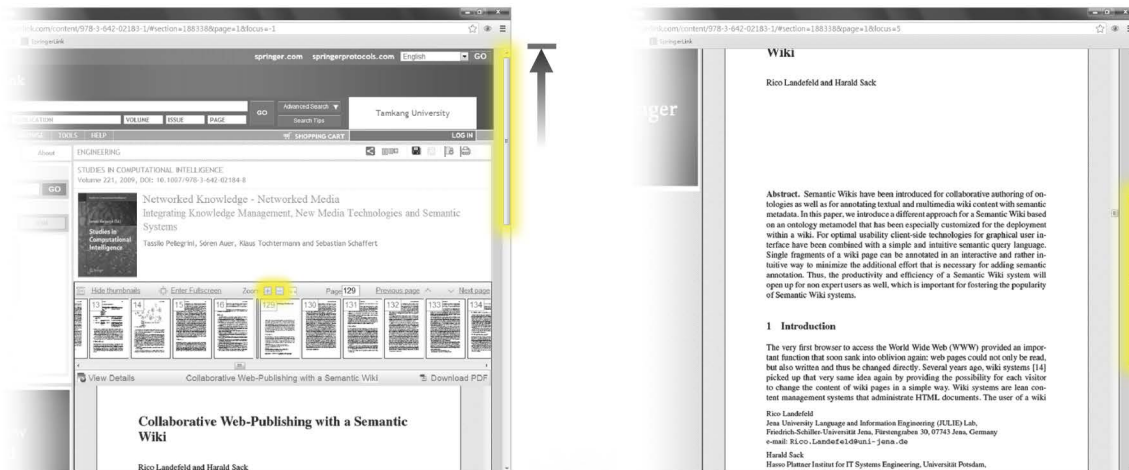

Figure 18. *SP*'s buttons disappeared from the screen when rolling down

It was reported from the participants that there was a web design problem on *EB*'s resize icon when using Google Chrome. *EB* platform adopts the form of embedded PDF in displaying e-books; however, PDF also provides its own tool bar. As a result, there are two tool bars shown on the screen, one from the *EB* platform and the other from the PDF, as depicted on Figure 19. The task analysis showed that the resize icon of *EB* platform does not work on Google Chrome (see the red dotted circle in Figure 19), but it worked fine on Internet Explorer. Because of this, one novice participant failed on the task. All other participants who used Google Chrome could successfully find the useful features of embedded PDF after realizing that they could not use *EB*'s magnifier button.

Browser: Internet Explorer
(embedded *Adobe PDF Reader* from other software)
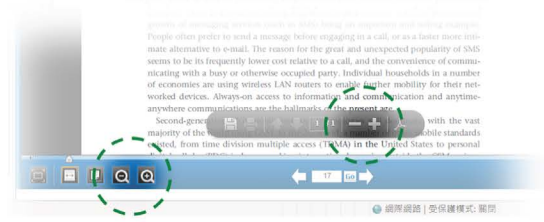
Browser: Google Chrome
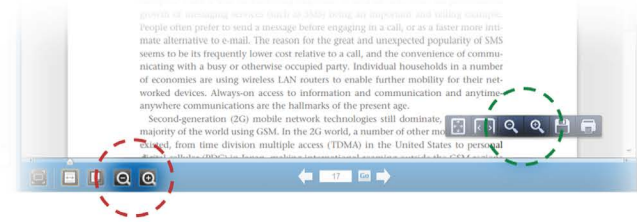(embedded Chrome own PDF reader from browser itself)

Figure 19. The duplicated icons on both the platform and the embedded PDF screen

Note. The red dotted circle means "not working" and green means the opposite.

Search

The results reflected in Table 14 indicated that there may be some mistakes on *SP*'s search features. Besides, as shown in the first row of Table 14, the factors, "experience" and "time spent," were positively correlated with one another on the *EB* platform. One expert participant's commented that:

> "This is a very important feature, but I think that the two platforms both need to improve. For one of the platform, I must click a button to see the search button, and other one is far away from the reading panel. I just think the search box should be very close to the reading panel." (E2)

Table 14

Time Spent and Success Rate on "Search"

Participants	EB		SP	
	Spend time	Success rate	Spend time	Success rate
Expert users	8.7 sec	100%	15.0 sec	33.5%
Intermediate users	11.0 sec	100%	16.0 sec	25.0%
Novice users	12.0 sec	80.0%	15.0 sec	40.0%
Summary	10.7 sec	91.7%	15.3 sec	33.3%

Note. Summarized from Appendix 4

The search icons are shown in Figure 20. For the testing on *EB* interface, two intermediate participants (50%) and three novices (60%) were not sure which icon looked like "search"

button when the tasks began. They moved around the mouse cursor to the icon they wanted to

look and waited to see the showing of tooltips (a pop-up bubble for help tips). The waiting time

was about one second, but participants often accidentally moved mouse out of the icon and

caused undesired delay.

Search on *EBSCOhost eBook Collection*: ④
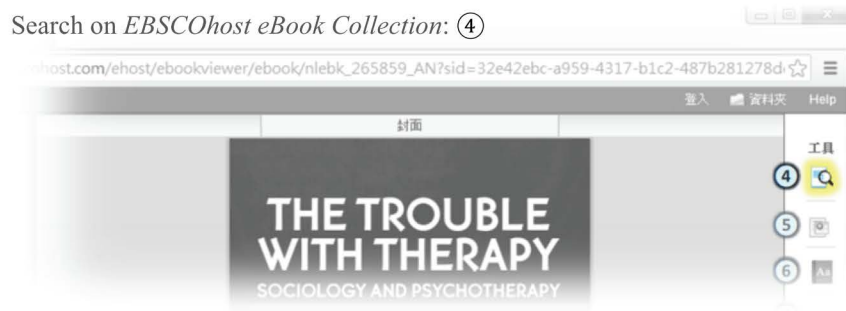
Search on *SpringerLink E-Books*: ⑬

Figure 20. "Search" on *EB & SP*

Note. The whole screen shot can be found in Figure 14 and 15 (p. 39 - 40).

Additionally, the translation of tooltips was confusing (Traditional Chinese) as shown in

Figure 21. *"The translated tooltips did not help me think that it is the search function at first.*

In contrast, I was able to understand better in the original text." (N3)

Figure 21. Tooltip language switching
of "search" feature on *EB*

Note. English (left); Traditional Chinese (right)

The design of *EB* search feature would be better if it eliminates the defects mentioned above. Although less experienced participants would try to use the tooltips because they were not familiar with the platform and icons, *EB* search icons and positions for each icon were design appropriately for most participants. For example, an expert participant noted:

> *"When seeing the icon, I immediately knew that is a search feature and I knew from the position of the icon that it means to search within this book, which is very institutive."* (E1)

As for the results of *SP*, nearly 70% of the participants were unable to complete the task including expert participants, because the researchers found that their attention were almost drawn to the black border inside (see Figure 22). A novice participant explained: *"I usually just focus on the inside of this box (mouse pointing to the black border) when using SpringerLink."* (N4)
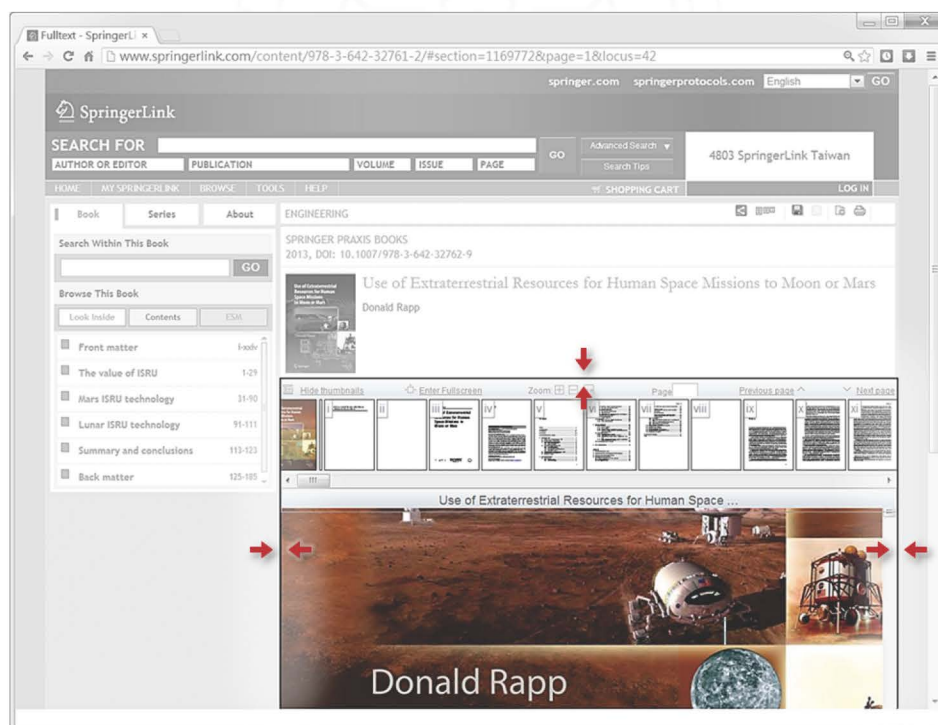
Figure 22.   Black border of reading panel with the red arrow point out

Note. The researcher slightly downplayed the black border around regions.

In addition, the position and text of interpretation are likely to mislead users into believing the search box is to search the entire platform. The following were two detailed accounts of this issue by participants:

> *"That is a bad placement of the search box. I had thought that it was to search the whole database. I guess the web designers also had the same concern, so he specifically put the words 'Search within this book' above the search box. But, doing this only makes the interface look more crowded and confusing. If it can be repositioned, I wish it could stay on the same row with the other features, or close to the reading window."* (I3)

> *"SpringerLink search box (placement) makes me think that it searches the whole database, rather than within this book. From time to time the function of the search box changed (see Figure 23), but only a tiny little line of tooltips was given for the change, which provides not much help, honestly. The entire interface is so condense, which is difficult to use for me."* (I1)
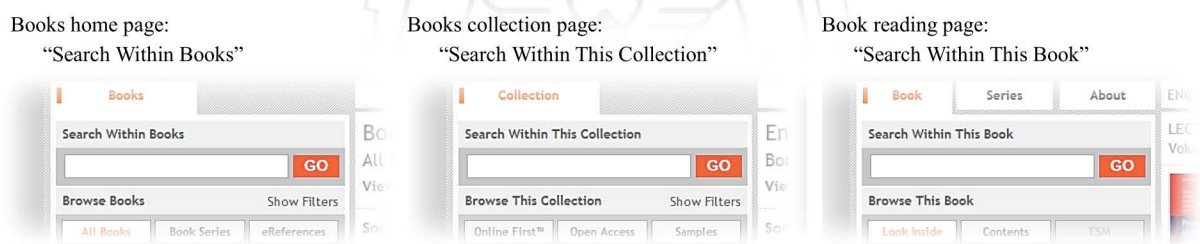
Figure 23.   Changes in the scope of search range by different page

Nonetheless, *SP*'s search feature is not altogether bad. Some participants expected that there is an "input box" that users can put in keywords directly, just like *SP* platform; without requiring a click to the icon to wake up the search box and its function, just like *EB* platform.

Copy and paste

The function of "copy and paste" has nothing to do with the user interface, but it is an extremely important feature for all participants, who revealed that they rely on this function not for plagiarism, but because they were just unwilling to type a lot of words for their work related to research, such as taking notes, making PowerPoint slides, doing translations, and compiling references. As a matter of fact, the e-book text could be copied and pasted on *EB* platform whether through "Ctrl + C" key combinations or from the right click feature list, but *SP* does not provide the same options (see Table 15). For this reason all participants can complete tasks on *EB* quickly for this part of testing. Participants revealed:

> *"I need the feature so much. In graduate school, you know, lead discussions in the class are often required; I have at least one presentation per week. If you can copy the text then making PowerPoint slides would be very easy."* (E2)

> *"Since SpringerLink can let people download PDF files, I wonder why it doesn't let us copy the text. Sometimes you wanna translate a single word or sentence, it is really troublesome that you need to type all the words and sentences by yourself. Copy and paste is really a very important feature for research. We're not to plagiarize, but we just need the feature to make our lives of translating or editing easier."* (I2)

Table 15

Time Spent and Success Rate on "Copy and Paste"

Participants	EB		SP	
	Time spend	Success rate	Time spend	Success rate
Expert users	2.0 sec	100 %	N/A	N/A
Intermediate users	2.8 sec	100 %	N/A	N/A
Novice users	3.0 sec	100 %	N/A	N/A
Summary	2.7 sec	100 %	N/A	N/A

Note. Summarized from Appendix 4; the "N/A" means without this feature.

4.1.2. Secondary Features

In this section, five features listed below in Table 16 were in the middle between the two extreme categories of necessary/unnecessary and important/unimportant. The list is in accordance with the researcher's findings with participants' responds. The ordering of the importance of the features from high to low is listed in the table, which is also the structure of this section.

Table 16

Number of Participants Who Need the Secondary Features

Features	Expert [a]	Intermediate [b]	Novice [c]	%
Notes	2	3	2	58
Highlight	2	2	2	50
Translate	2	1	1	33
Print	1	1	0	17
Font resize	0	0	1	8

Note. [a]$n = 3$, [b]$n = 4$, [c]$n = 5$, $N = 12$.

Notes

Graduate students often need to do comprehensive literature review so that their studies could be based upon previous research; therefore, they must take notes to jot down their thoughts and inspiration simply and quickly. Everyone is different and takes notes in different ways according to their own habits. In the research, there were more than half of the participants (58%) indicated that they wanted the feature "notes" on e-book platforms. One of the experts explained:

> *"We must read a lot of literature every single day, you know. If I need to open another file like Word or TXT or even hand write, uh... according to my experience, that will not work and would become a disaster eventually."* (E2)

However, only *EB* has this feature. In the testing task, almost 92% participants could successfully complete the task, and only one intermediate user could not (see Table 17). Ex-

perts were the fastest to complete the task; intermediate users were second, and novice users were the slowest.

Table 17

Time Spent and Success Rate on "Notes"

	EB		SP	
Participants	Time spend	Success rate	Time spend	Success rate
Expert users	8.3 sec	100 %	N/A	N/A
Intermediate users	9.0 sec	75.0%	N/A	N/A
Novice users	9.4 sec	100 %	N/A	N/A
Summary	9.0 sec	91.7%	N/A	N/A

Note. Summarized from Appendix 4

Because the majority of experts usually did not check tooltips, intermediate users could identify the icon of sticky notes (see Figure 24), but they still needed to examine the tooltip to confirm because they were not absolutely sure. The novice users browsed the tooltip one by one to look for the correct one. The majority of participants explained that the function of the "notes" on *EB* could meet the basic requirement of users; nonetheless, they still wanted some more from the "notes" function that *EB* does not yet have, which includes: 1) showing the list that users make with chapter numbers, page numbers, and note headings; 2) connecting the feature "notes" with "highlight," so users could freely make notes and link to the text highlighted, or anywhere on the page. Some of those participants revealed:

> *"If it (the 'notes' of EB) can combine the functions of notes and highlight that would be perfect! Just like reading a newspaper or books, I could highlight and make notes. I wish I could do the same thing on e-books."* As the researcher continued to ask him further about combining the two functions, he continued to explain: *"This is what I mean--I wish the notes could really be integrated into the pages and become a regular function; for example, connecting the notes function to a word, a sentence, a picture, a table, a highlight, etc., so that taking notes is very easy and efficient."* (E3)

"Although it (the 'notes' of EB) can show page numbers, I think titles of chapters as well as notes should be added. As long as there are titles on the notes list, you can click it to read the page and the notes you made." (I1)

"I think chapter numbers and the title of notes are needed. It's best to show the titles on the notes list, and then you can click on the title and be taken to the exact page and see the notes you wrote." (N5)
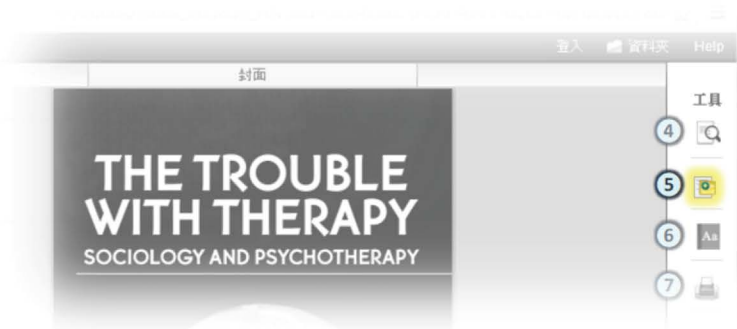

Figure 24. "Notes" on *EB*

Note. The whole screen shot can be found in Figure 14 (p. 39), and it was not available in *SP* platform.

Highlight

The feature "highlight" is not available on the two platforms; nevertheless 50% of participants felt that they needed the highlight function when reading e-books. The varied opinions for the necessity of "highlight" were mainly because users' reading habits are normally somewhat different. It is fair to say the majority of participants think it was not a most critical feature; however, it could surely assist reading to a certain extent, particularly on those lengthy chapters. Additionally, they would also like that the highlight traces be retained until after the PDF files have finished downloading or papers printed out. The participants stated:

"Usually, I would mark a sentence that I wanted to reference. Doing this would help my thoughts not being interrupted and so that I could continue to read. I hope the highlight function has at least two to three colors, and could be erased; besides, the highlight function should be kept traces on the PDF file or until papers were printed." (E1)

"My working habit is to hold my breath and keep reading until I finished with the whole thing, and then go back to reread the key points I saw. So I really need the highlight feature." (I1)

Translate

There were four respondents (33%) who think the "translate" function is a valuable feature in the interface of e-books reading. Only *EB* has the English-English dictionary type of translation, while *SP* has no "translate" features at all. In the *EB*'s testing, all participants were able to complete the task (see Table 18) and about 67% immediately recognized the dictionary icon (see Figure 25), and directly moved the mouse to the icon to check the tooltip. Only four participants (33%) browsed the tooltips one by one in order to identify the icon. The icon on *EB* platform was easy to find; however, some problems were found when using the English-English dictionary. Almost all participants responded that it was not what they expected in terms of a "translate" feature. The participants stated:

"I think EB should have a better translate tool designed for local users; otherwise, I prefer to use Google Translator." (E3)

"Because EB is an academic environment, I thought it would provide an academic or an advanced dictionary, like Collins COBUILD, but it seems it's not the case." (I3)

"It is good that EB has a dictionary feature available, but truly, providing only an English-English dictionary is not helpful for us." (N3)

Table 18

Time Spent and Success Rate on "Translatioin"

Participants	EB		SP	
	Time spend	Success rate	Time spend	Success rate
Expert users	9.0 sec	100 %	N/A	N/A
Intermediate users	8.5 sec	100 %	N/A	N/A
Novice users	11.4 sec	100 %	N/A	N/A
Summary	9.8 sec	100 %	N/A	N/A

Note. Summarized from Appendix 4
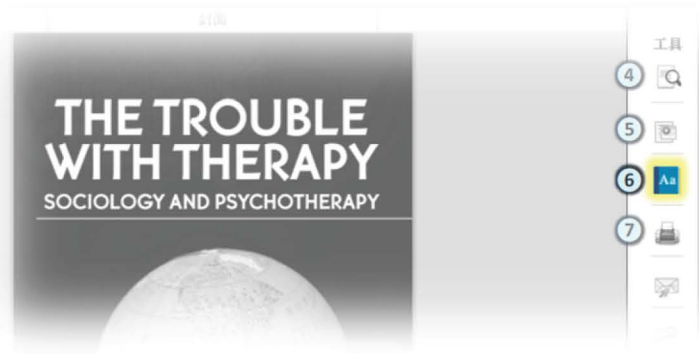
Figure 25. "Translate" on *EB*

Note. The whole screen shot can be found in Figure 14 (p. 39).

SP does not have a translate feature.

Print

Only two respondents (17%) believed they needed the printing feature, but the rest think that it was a dispensable feature for e-books. The participants revealed:

"The reason I'm willing to use e-books is just because I don't want to print them out." (E2)

"When I read e-books or PDF file, I usually would not print it out." (I4)

"Since I can read the online e-books, why print them out? Doing so is a waste of resources." (N1)

For the testing tasks on *EB*, the majority of participants (75%) quickly located the printer icon (see Figure 26) and believed that was for printing; however, to their surprise, this icon was for downloading PDF files that is different from printing. Therefore, instead of obtaining the print function, the respondents found the printer icon. Only two respondents were successfully completed the print task (see Table 19), although they did not complete the task via the icon on the platform. They were able to complete the task through the features of the embedded PDF viewer. For this issue, participants said:

"The icon is a printer, but the feature is to download. This is really weird. Why not use an icon that is obvious for download? ... The icon or feature should be changed. Obviously the PDF download has nothing to do with the actual printing!" (E3)

54

Print on *EBSCOhost eBook Collection*: ⑦

Print on *SpringerLink E-Books*: ⑮

Figure 26. "Print" on *EB & SP*

Note. The whole screen shot can be found in Figure 14 and 15 (p. 39 - 40).

"I had thought the icon means to print, but when I clicked on the icon, it led me to download the PDF file. I think it wasn't meant for printing, so why use the printer icon? However, I could still use the right click to print. I just do not understand why they designed the icon this way." (I1)

"Since the feature is to download the PDF, not the printing function, it is very misleading. It would make users think this platform is very unprofessional." (N2)

An interesting fact that is worth mentioning is that almost all participants thought the "download PDF" function is actually more useful than the printout function.

Table 19

Time Spent and Success Rate on "Print"

	EB		SP	
Participants	Time spend	Success rate	Time spend	Success rate
Expert users	3.0 sec	33.3%	all failed	0 %
Intermediate users	4.0 sec	25.0%	all failed	0 %
Novice users	all failed	0%	all failed	0 %
Summary	3.5 sec	16.7%	all failed	0 %

Note. Summarized from Appendix 4

For *SP* platform, the printer icon (see Figure 26) is too small and the interface is too complex; therefor, the respondents had to spend some time looking for it. Furthermore, the feature was unable to work correctly because when clicking on the printer icon, but it became a full screen display for reading. This situation was so confusing that the respondents felt very much puzzled, including the researcher.

Font resize

Only one novice user believed that he needed this feature, he said:

"Reading on the screen for a long time makes me concerned about the health of my eyes, so it is good that if we can adjust the font size and the page will not go beyond the screen limit. This will relieve the pressure of my eyes." (N2)

However, the other eleven participants (92%) contributed a different view regarding the "window resize" feature and thought it could replace the "font resize" feature. In addition, the most important reason was they needed the page number for reference, because changing the font size would mess up the page number. An expert user explained:

"There is the window resize feature, so the font resize becomes dispensable. Moreover, changing the font size may mess up the page number, which would cause a lot of trouble for making reference later. So I say this feature is not necessary." (E2)

4.1.3. Unnecessary Feature

Share

This feature was available on both platforms; nevertheless the success rate of the task performed was low (see Table 20). Furthermore, no participants could complete the task on *SP*. This is because after they clicked the "share" button (see Figure 27), they entered a complete unknown website, so all participants just immediately gave up. The poor result was due to the fact that the participants were unfamiliar with this feature. Also, after further discussions with the participants, the researcher realized that they simply had never used this feature before. They explained:

"It's useless for me. I think these academic data are private; ideas need to be kept confidential. Besides, each person has his own area of interests for research. There is no need to share with each other." (E1)

"This feature does not make sense. I don't want to share my schoolwork with my friends. Nobody will post 'uh... I read so and so book today' on Facebook, right? At least I'm not interested in doing this." (I3)

Table 20

Time Spent and Success Rate on "Share"

Participants	EB		SP	
	Time spend	Success rate	Time spend	Success rate
Expert users	15.5 sec	66.7%	all failed	0 %
Intermediate users	26.0 sec	50.0%	all failed	0 %
Novice users	31.0 sec	20.0%	all failed	0 %
Summary	22.8 sec	41.7%	all failed	0 %

Note. Summarized from Appendix 4

Share on *EBSCOhost eBook Collection*: ⑧

Share on *SpringerLink E-Books*: ⑭
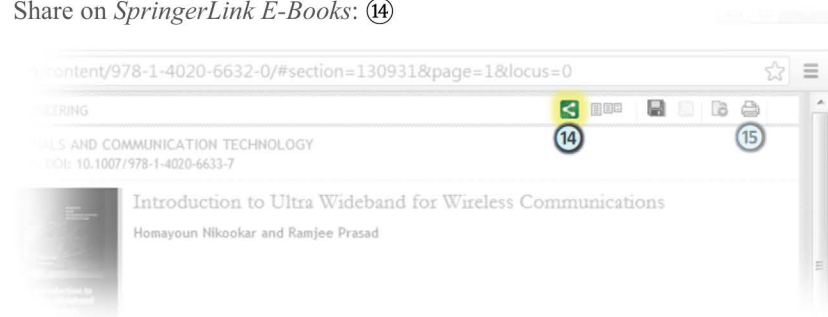
Figure 27. "Share" on *EB & SP*

Note. The whole diagram, please refer to Figure 14 and 15 (p. 39 - 40).

Finally, the overall results for the above analysis were summarized in Table 21. Seen from the table, the *EB* platform has more features and better performance on multiple tasks. Generally, *SP* only outperformed *EB* on "page turn." For the rest of the tasks, the results showed *SP* was inferior to *EB*.

Table 21

Overview Result of Usability Testing

Group	Features	EB		SP	
		Spend time	Success rate	Spend time	Success rate
Necessary	Page turn	3.3	100.0	2.8	100.0
	Copy/paste	2.7	100.0	N/A	N/A
	Window resize	5.5	91.7	12.8	91.7
	Search	10.7	91.7	15.3	33.3
Secondary	Translate	9.8	100.0	N/A	N/A
	Note	9.0	91.7	N/A	N/A
	Print	3.5	16.7	all failed	0.0
	Font resize	N/A	N/A	N/A	N/A
	Highlight	N/A	N/A	N/A	N/A
Unnecessary	Share	22.8	41.7	all failed	0.0
Summary		8.4	79.2	10.3	45.0

4.2. Overall Assessment of the Two Platforms

Based on Quesenbery's 5Es (2003), this section is to give an evaluation of the two plat-forms with the results from the survey of online questionnaires and in-depth interviews of usability testing. The online survey was the main analytical method while the remarks of the participants of usability testing would be added to provide further explanations.

4.2.1. Overall Responses to the Survey

The survey ran from October 1st to November 30th, 2012, the researcher received 121 responses at the end of the period. In the total valid questionnaires of 104, the effective rate of response was 86%. Given the multiple methods used to distribute the questionnaires, it is not possible to compute a response rate. Nonetheless, since we already knew the total number of population (i.e., 3,192 graduate students), 104 replies would account for 3.3% of the total population.

The demographics of the survey respondents are: 56.7% females and 43.3% males; 4.8% doctoral students and 95.2% masters' students; 39 students from the College of Engineering (37.5%), which accounted for the majority of the survey respondents; College of Education accounted for the least (0.96%). More detailed information is listed in Table 22, Table 23, and Table 24.

Table 22

Demographics of Survey Respondents: Gender

Gender	No. of responses	No. of population	Percentage of total responses ($n = 104$)
Male	59	1,930	56.73
Female	45	1,262	43.27

Table 23

Demographics of Survey Respondents: Education Background

Student identity	No. of responses	No. of population	Percentage of total responses ($n = 104$)
Master	99	2,625	95.19
Doctoral	5	567	4.81

Table 24

Demographics of Survey Respondents: Field of Study

School	No. of responses	No. of population	Percentage of total responses ($n = 104$)
Engineering	39	853	37.50
Business and Management	33	739	31.73
Liberal Arts	14	312	13.46
Foreign Languages and Literatures	8	288	7.69
International Studies	7	549	6.73
Science	2	239	1.92
Education	1	212	0.96

As stated in Chapter 3, there were 22 expert users, 51 intermediate users, and 31 novice users. The percentage is shown in Figure 28.
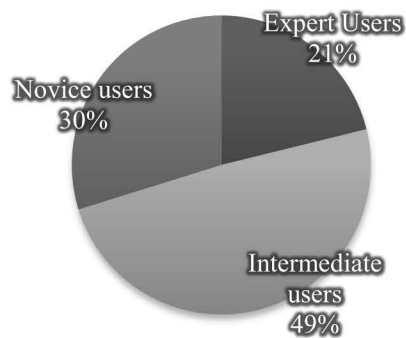
Figure 28. Percentage of users category

In order to examine the reliability of the 5Es questionnaire, the researcher carried out Cronbach's alpha coefficient computation, in which a value of 0.7 would show a satisfactory

reliability. In this research, the result for Cronbach's alpha level is above 0.9 (see Table 25), indicating that the questionnaire has an excellent reliability.

Table 25

Cronbach's Alpha Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N. of Items
0.916	0.917	10

Table 26 provides the descriptive statistics. The table shows that the "effective" of *EB* was highest rating of the response and "error tolerant" of *SP* was lowest. Additionally, the highest C.V was "Error Tolerant" on the two platforms.

Table 26

Descriptive Statistics

Platfrom	Five Es	Maxi	Mini	Mean	Std. Deviation	C.V
EB	Effective	7	2	5.35	0.955	0.182
	Efficient	7	2	5.20	1.040	0.200
	Engaging	7	3	5.08	1.083	0.211
	Error Tolerant	7	1	4.81	1.177	0.241
	Easy to Learn	7	2	5.26	0.983	0.187
SP	Effective	7	2	5.08	1.068	0.207
	Efficient	7	2	5.17	1.093	0.209
	Engaging	7	3	5.14	1.107	0.213
	Error Tolerant	7	1	4.77	1.135	0.233
	Easy to Learn	7	3	5.22	1.083	0.205

Note. Maxi/Mini: The maximum and minimum response

C.V.: The coefficient of variation

4.2.2. Five Es Assessment

The 5Es were assessed by different levels of users, which were *expert users*, *intermediate users*, and *novice users*. An overall analysis is followed.

Expert users

In Figure 29, it shows the satisfaction compared by expert users for the two platforms. *EB* was significantly better than *SP* for expert users, specifically in the criteria of "effective." From in-depth interviews the researcher found that expert users paid particular attention to the performance of core features when they judged the "effective" criteria on e-book platforms. Moreover, core features were proposed, including page turn, window resize, search, and copy/paste that were also "necessary features" of previously mentioned categories. Therefore, it was concluded that *EB* has all the necessary features and the performance met the expectations of expert participants. Although *SP* had a satisfactory "page turn," the rest of necessary features were disappointing; for instance, there was even no "copy/paste" available.
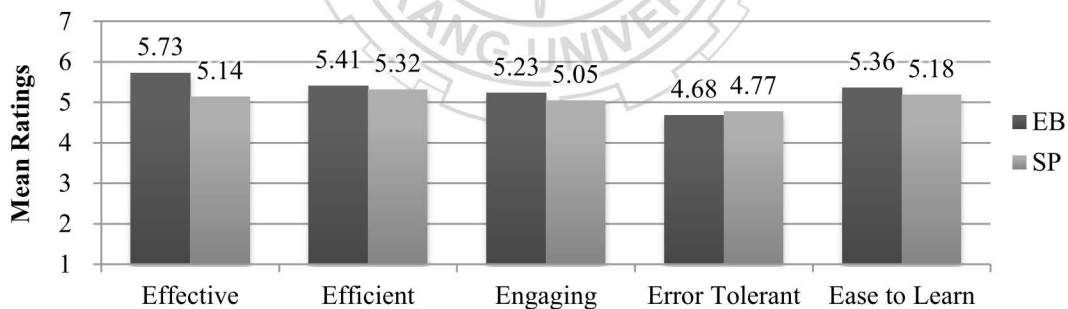
Figure 29.   Mean questionnaire responses by expert user

In addition, the majority of expert participants noted that some features in *EB* needed to be activated by clicking on an icon (button) to open up the function panel; however, if these "some features" are not core features, this extra step actually causes no harm because doing so would not reduce the "efficient" of reading, but give users a clean and neat interface, thus, improved the "engaging." As mentioned before, these features on *EB* included "notes," "translate,"

"print," and "share." Nonetheless, *SP* has an absolutely different situation. The layout of the platform was complicated and the text was densely packed on the platform. For this reason even though *SP*'s "page turn" feature was efficient and performed well, *EB* scored better than *SP* on the criteria of "efficient" and "engaging." Additionally, those experts revealed the clear structures of the interface helped them learn more easily, which also explained why *EB*'s "easy to learn" was relatively higher. For the criteria "error tolerant," the performance of the two platforms were both lower than the other Es. According to the expert participants' explanation, the operation needed only one or two steps on each feature and users almost did not need to type in any data. Therefore, it was not easy for the users to examine whether "error tolerant" was truly an issue or not. As a result, the respondents had no impression on this topic and provided a nearly neutral answer on the questionnaires.

Intermediate users

As shown in Figure 30, there was no significant distinction between these two platforms of intermediate users' responding. The largest gap was merely 0.14 on "easy to learn," and the rest were all less than 0.1; furthermore, the value of the overall mean ($EB/SP = 5.36/5.38$) was the highest among the other types of users (experts: $EB/SP = 5.28/5.09$, novices: $EB/SP = 4.77/4.75$). The reason might be because the majority of features of the two platforms could satisfy the users. Even so, from the results of the in-depth interview, intermediate participants revealed that they thought the performance of the two platforms were similar; not one particularly superior to the other. For example, the users' general opinion of "efficient," as a participant described: *In EBSCO, the good layout improved usage efficiently, but the 'page turn' was really too slow. In contrast, SpringerLink was exactly the opposite situation."* (I1) For the element "engaging," intermediate participants revealed that the bigger reading area and icon increased their feeling of engaged on *EB*. But the slow flipping reduced the degree of "engaging." On the other hand, participants really enjoyed *SP*'s continuous-flip, which did not

require reloading of each page. Two intermediate participants particularly mentioned this during the interview when asked about the element of "engaging." Nevertheless, they also disclosed that *SP* had a complex layout and some items (i.e., buttons, words), such as "window resize" and "search," were simply too small. Their pros and cons were set off against each other as mentioned above. That perhaps could explain why the result showed no significant distinction in this part.
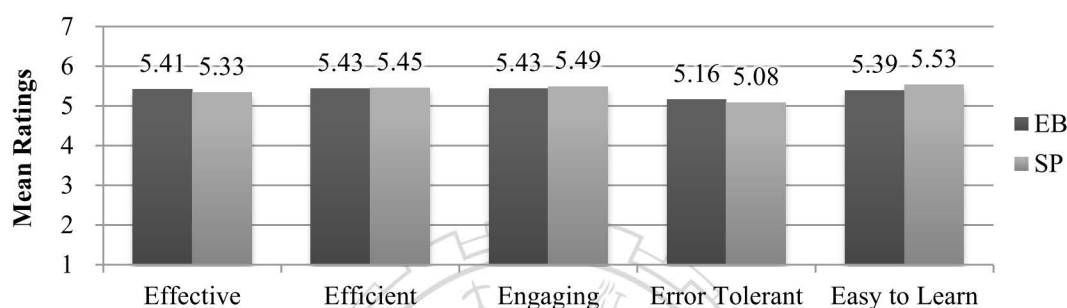
Figure 30.   Mean questionnaire responses by intermediate user

Novice users

Figure 31 showed the response of novice users. In this part, "easy to learn" scored the highest in the two platforms, meaning that the novices can quickly get started without many difficulties. Besides, *EB* was slightly better than *SP* in the majority of the "Es" for experts and intermediate users. But it is worth mentioning that the element of "engaging" on *SP* was 0.29 points higher than *EB*, namely *SP* was more attractive to the novice user. In the interview, the main reason for that situation was easy to discover: it was "page thumbnails" (see Figure 16, ⑪, p. 42) that was a popular feature for many participants, especially novices. One of the novice participants disclosed that he could often see the similar features on other software programs, like *Adobe Reader*, *Microsoft Word* or *Microsoft PowerPoint* (see Figure 32). Because users were not necessarily familiar with e-book platforms, popular features like "page thumbnails" could immediately attract novice participants when they used *SP*.
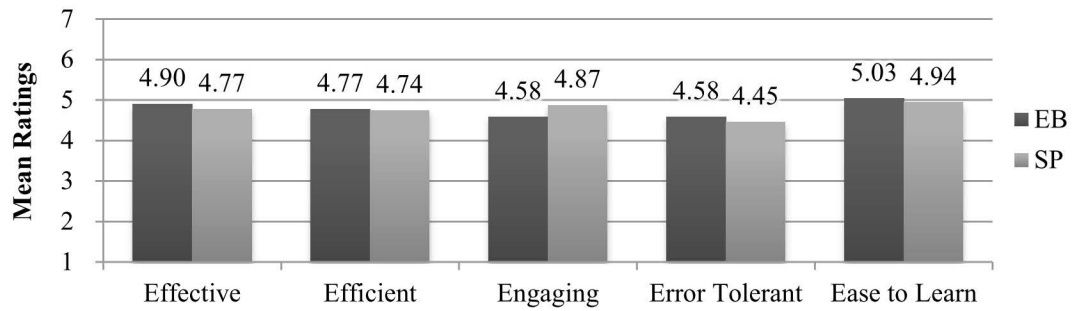
Figure 31.　　Mean questionnaire responses by novice user

Furthermore, the researcher observed that the novice participants also paid attention to the additional (*secondary* and *unnecessary*) features besides the core (*necessary*) features. Unlike the expert participants who focused only on core functions, they thought *EB* has more features than *SP* that was more effective, which may explain why the "effective" of *EB* was 0.13 points higher than *SP*.

| Adobe Reader | Microsoft Word | Microsoft PowerPoint |
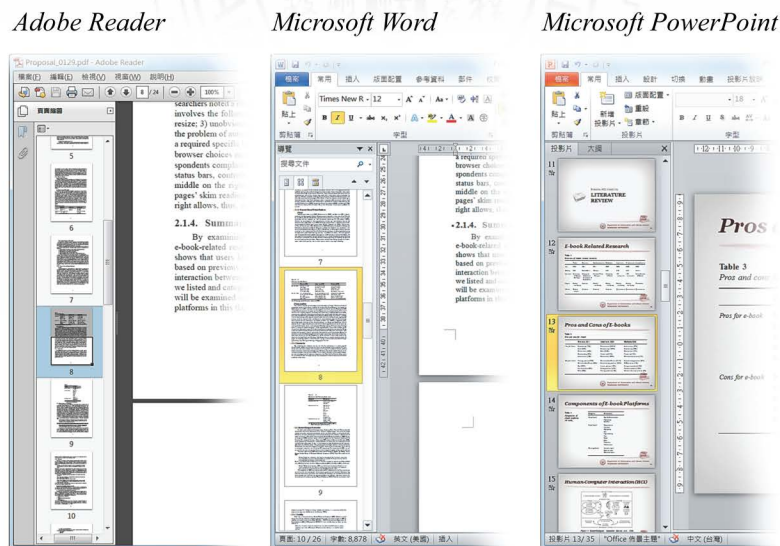
Figure 32.　　"Page thumbnails" on other interfaces

Overall Usability Scores

In this section, we provide the overall usability results of the two platforms. The assessment is based on the responses from the online survey, the 5Es dimensions (see Figure 33), and the in-depth interviews. The overall results are calculated through weighted means. It should be noted that the 5Es dimension was referred to the importance of different dimension for analyzing general e-book platforms, not specifically to any particular website such as *EB* or *SP*; additionally, the dimension was used 5 percentage points as the minimum unit. The overall usability scores of the two platforms were shown in the Table 27. Finally, the usability performance of *EB* was slightly better than *SP* as found in this research.
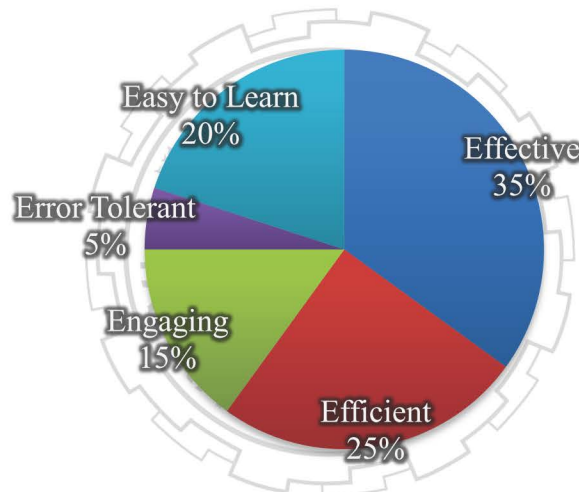
Figure 33. The 5Es dimension of "e-book platforms"

Table 27

Overall Usability Scores with Weighted Mean

Five Es	Weight coefficient	EB		SP	
		Ex-weighted	Weighted	Ex-weighted	Weighted
Effective	35%	5.35	9.36	5.08	8.89
Efficient	25%	5.20	6.51	5.17	6.46
Engaging	15%	5.08	3.81	5.14	3.85
Error Tolerant	5%	4.81	1.20	4.77	1.19
Easy to Learn	20%	5.26	5.26	5.22	5.22
Weighted Mean			**5.23**		**5.12**

4.3. Discussion

This section provides a discussion of the responses for the main research questions in this study; there is also discussion on how the findings from this study compare with previous studies. In addition, based on the findings, several practical recommendations are provided. Lastly, we report an unexpected revision of *SP*'s website during the time of the study.

Users' Preference on Academic E-book Platforms

In Chapter 2, we reviewed the basic components that users care about on e-book platforms and thus summarized the 10 features. The usability of the 10 features is the main theme throughout the research. Nonetheless, when the usability testing was completed, the researcher discovered that they were not all features entirely suitable for the needs of users on e-book platforms of an academic library. Consequently, the 10 features were divided into three categories (*necessary*, *secondary*, and *unnecessary*) by the responses of the 12 participants.

The *necessary* features are: "page turn," "window resize," "search," and "copy and paste." First, for "page turn," users preferred the uninterrupted page flipping. As the name suggests, it means the e-book does not reload each page when users flip to the next page. Moreover, they preferred "page thumbnails" as *SP* provides; novice user would particularly ask for this function. Second, for "window resize," the users preferred a moderate sized icon and the multidimensional zoom in and out design. For the "search" feature, the only problem was that it is confusing for the users to know whether it is for searching within the book or the whole website. The best solution was to arrange the search box/icon together with other core features and near the reading panel. Last, the "copy and paste" feature, which seem not related to the layout of the platform, is found to be an extremely important feature on an academic e-book platform, especially for graduate students or researchers. Although users have slightly different preferences of the four functions noted above, they specified that the necessary features must be extremely close to the reading area.

Other additional features include "notes," "highlight," "translate," "print," "font" and "share," which can assist users with better reading efficiency, but are not necessarily essential functions. For instance, "notes" and "highlight" are relatively popular features; more than half of the respondents (58% and 50%, respectively) believe are the required function. For the remaining features, they seem relatively unhelpful for most of the users in the study, especially, the "share" feature is found to be the most unnecessary feature revealed by all testing participants. However, the researcher found two other features that users needed, but are not mentioned in the past literature, which are "directory links" and "bibliography maker." These are also common functions on academic e-book platforms. In this study, the two platforms both have a similar structure for the table of contents that has links for each chapter. Additionally, *EB* has a "bibliography maker" on the platform labeled as "cite," which provides MLA, APA, and Chicago style, but *SP* does not provide such function. For graduate students and researchers, the "bibliography maker" is an important tool for compiling and organizing references for their theses and research papers.

Compared to the examples of museum website and registration form (referring to Figure 8, p. 24) described in Chapter 2, we could see that academic e-book platforms have entirely different 5Es dimensions that focused on the element of "effective," following by "efficient," "easy to learn," "engaging," and lastly "error tolerant." For the results of 5Es evaluation in the case study wherein the *EB*'s effective of expert rating received the highest score of 5.73 points. Based on the analysis of the 5E dimension, *EB* turns out to be the expert users' favorite platform. Furthermore, *EB*'s performances of different dimensions almost all received higher scores than *SP*; in short, *EB* performs better than *SP* in our study. Nonetheless, there is no drastically great gap between the two platforms. *SP* still had some outstanding scores such as the elements of "efficient" from intermediate users and the element of "engaging" from novice users. Based on the research result, the research speculated that the reason might be because the "page turn" features of *SP*, which has a rather popular tool-- "page thumbnails," as well as faster page flips.

What is the Better Design of UI?

The research revealed a great deal of findings and knowledge about users' preference for interface design; thus, in the following section, the researcher proposes several practical recommendations for design user-friendly interface.

For icon designs, we suggest the textual tips be integrated into iconic labels. The study found that non-expert users usually needed to seek tooltips in order to identify the features. They often need to browse them one by one and very often their mouse would accidentally move away from the range of the icon, causing the unwanted waste of time when redirecting their mouse. Peter Morville and Louis Rosenfeld (2002) noted that users regularly encounter labels in two formats: textual and iconic; among them, textual labels remains the most common so far because most users could not depend entirely on the iconic labels and hence need textual explanations, unless they are loyal or expert users. This means that web designers should reduce the use of the iconic labels alone, while using textual labels or icon/text pairing labels (as shown in Figure 34) are strongly advised.
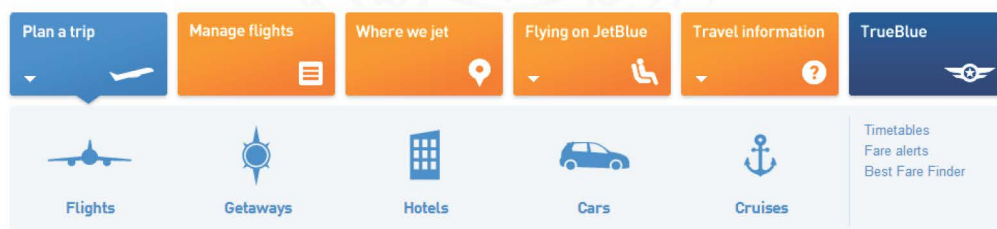
Figure 34. An example of "icon/text pairing label" form jetBlue.com

However, in this research, almost all participants indicated that they did not want to see too much text on the already crowded interface. They explained that more than half of the screen is occupied by lots of text because of the content of the e-book; thus, if the interface is further mixed with a great deal of textual labels, that would be very confusing for them. In other words, iconic labels are particularly suitable for the use on academic e-book platforms, while textual labels are not. Furthermore, Morville and Rosenfeld (2002) also stated:

"In fact, if your site's users visit regularly, the iconic 'language' might get es-tablished in their minds through repeated exposure. In such situations, icons are an especially useful short-hand, both representational and easy to visually recognize—a double bonus."

For the above reasons, we propose a design that shows the "icon/text integrated label" by de-signing the text into tooltips of icons (see Figure 35).

Figure 35. The "icon/text integrated label"

Note. From top to bottom from left to right respectively: search, notes, download PDF, highlight, dictionary, and cite.

In addition, we provided a layout model (see Figure 36) that was based on the best plat-form of my usability research result, *EB*. Moreover, we incorporate some ideas of participants such as:

- The core (*necessary*) features should be near the reading panel.

- The panel of non-core (*secondary* and *unnecessary*) features could be hidden and not be seen by users.

- The reading panel should be fixed in the center of the screen.
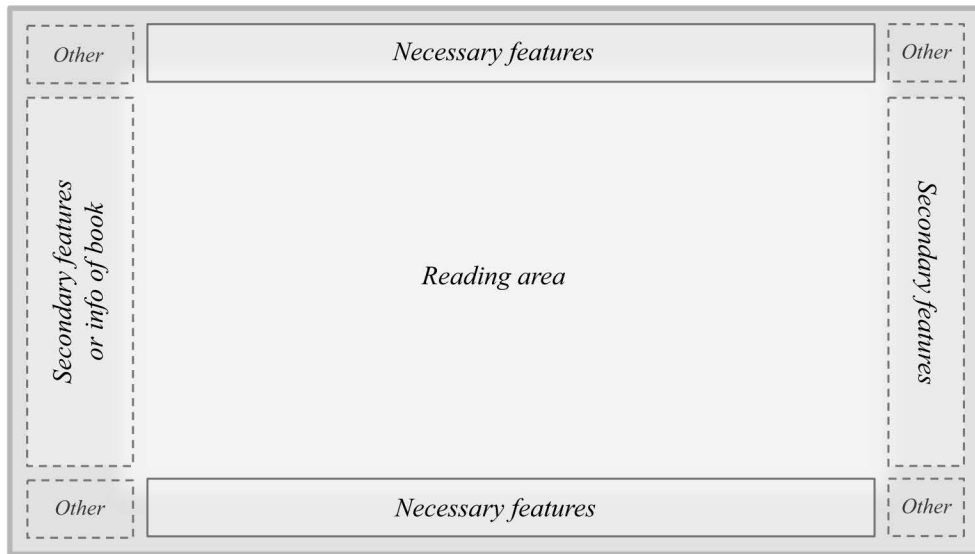
Figure 36. The UI layout model of academic e-book platforms

Note. The dashed frame indicates that the panel could be open and closed and it is scalable.

Finally, based on the research results, we propose a complete template of a practical UI design of an academic e-book platform, as shown in Figure 37.
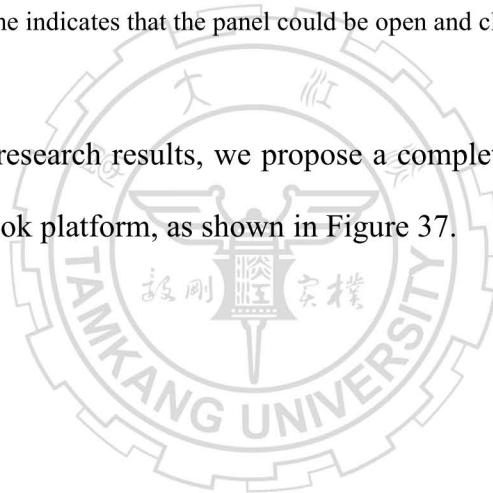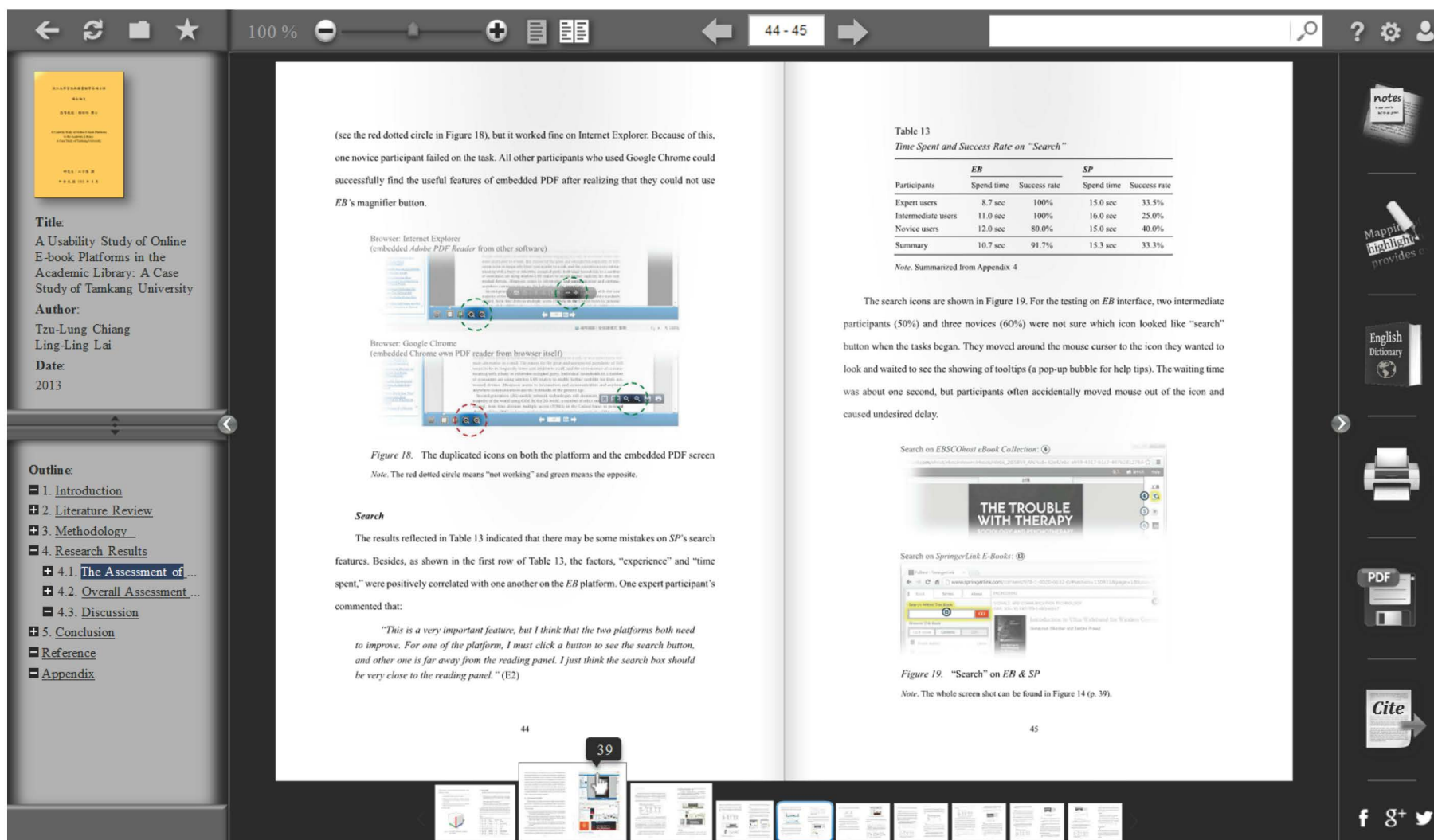
Figure 37. A proposed UI template of an academic e-book platform

SP Revision Update

To the surprise of the researcher, the *SP* e-book platform being examined by the study underwent a significant update on October 15th, 2012. It occurred precisely during the period of data collection of this research (October 1st to November 30th, 2012). Fortunately, the research still had time to ask 8 participants for their opinions on the new interface of *SP*. Everyone were shocked when they saw the new interface (see Figure 38) because the revision is rather drastic compared with the old UI design. As the interviews discovered, the participants all could not accept the fact that almost all the features were gone; nonetheless, it is a very clean and simple face, as if the designers were trying to get rid of all the problems in the past, however, the change was so drastic that it seemed to go beyond user's imagination.
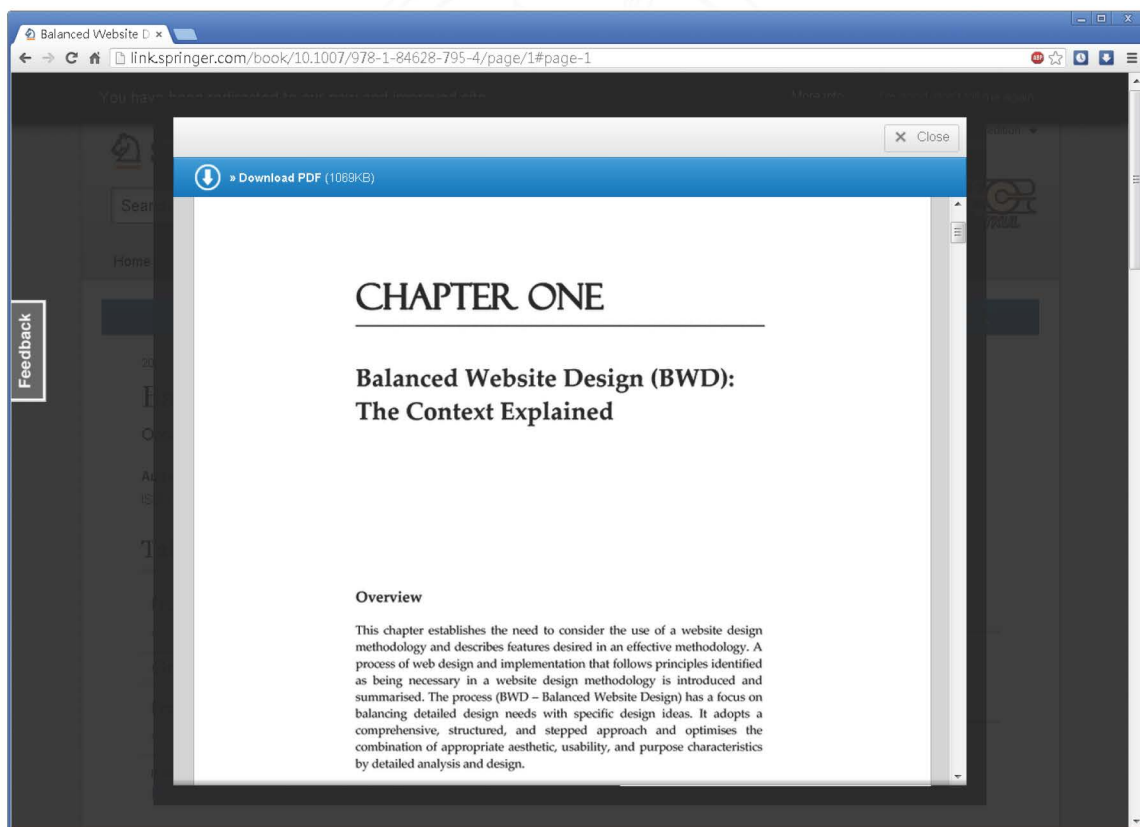
Figure 38. The new interface of *SP*

5. Conclusion

The research applied 10 features and 5Es to evaluate the usability of two academic e-book platforms: *EBSCOhost eBook Collection* (*EB*) and *SpringerLink E-Books* (SP). The results showed that "page turn," "window resize," "search" and "copy/paste" are the most commonly used and most important features for academic e-book platforms. *EB* has more complete features, but its "page turn" was slow. In contrast, *SP* is completely the opposite, which flips fast and has a popular "page thumbnails" feature, but all the rest of features perform poorly. Moreover, the 10 features have different degrees of necessity from the user's perspective, as summarized in Table 28. Additionally, based on the evaluation of 5Es, the research found that the rankings of 5Es, in terms of importance and in particular for academic e-book platforms, are:

Effective > **Efficient** > **Easy to Learn** > **Engaging** > **Error Tolerant**
35%   25%   20%   15%   5%

In this case study, the researcher investigated and compared the user's satisfaction of 5Es between *EB* and *SP* platform through an online survey. Analysis of the results suggested that "effective" of *EB* performed the best; the second was "easy to learn," and the third was "efficient." On the other hand, "Easy to Learn" scored the highest on *SP* platform; the second was "efficient," and the third was "engaging." Nonetheless, *SP* has a relatively poor performance on the most important E, i.e., the "effective." Overall, *EB* was better because it performed better on 80% of 5Es (sum of the top 3 Es). Furthermore, we calculated the final grades through weighted means to find that *EB* scored 5.23, while *SP* scored 5.12. To summarize, the usability of E*B* was slightly better than *SP* in this research.

The study has a number of significance in its nature. Comparing the results with other similar studies (referring to the section of *2.2.2. Similar Research Studies*), this research not only covered a variety of academic disciplines but also different levels of user experience, including expert users, intermediate users, and novice users. In addition, this research used spe-

cific indicators based on the analysis of the literature review, which were the "feature-oriented" (i.e. the 10 features) and the "usability-oriented" (i.e., the 5Es) so that the results of the study can provide insights that are both functional as well structural, which in turn gives the foundation for a proposed working model for friendly UI design. Furthermore, the data in the study was collected through triangulation; thus, the results revealed high reliability.

Table 28

Ten Features of User's Preference on Academic E-book Platforms

Features name	Importance (%)	User's Preference	User's Aversion
Page turn	100	✅ Fast, almost no waiting time when turning pages ✅ Arrow icon and page thumbnails ✅ Icon stay close to reading panel	❌ Need to reload each page when clicking on "next page"
Copy and paste	100		❌ Cannot select and copy text
Window resize	100	✅ Icon stay close to reading panel	❌ Too few dimensions
Search	100	✅ An input box on interface, do not need to click any button to open it ✅ Icon stay close to reading panel	❌ Unclear distinction between "searching this book" and "searching whole website"
Notes	58	✅ Need a clearly identifiable icon (Because the majority users do not have experience of encountering this feature in other software.) ✅ Show the chapter, page and headings on notes list ✅ Combine with "highlight"	
Highlight	50	✅ Two choices of color for highlight at least ✅ Combine with "notes" ✅ Need to show marks of highlights on PDF files when users download	
Translate	17	✅ More language, at least for the local ✅ Advanced/academic dictionary	❌ Only English-English dictionary provided
Print	17	✅ Can be replaced with feature of download PDF	❌ A printer icon, with the actual function for downloading
Font resize	8	✅ Can be replaced with "window resize"	
Share	0	✅ Design it into an inconspicuous spot	

As with all other research, this study has its own limitations. Since data collection was solely carried out at Tamkang University, the scope is rather limited. Nonetheless, the researcher made every effort to cover a variety of testing participants through cautious data collection, as described in previous sections, so that the samples are representative of the population of the campus. Second, the researcher is fully aware that some of the features, such as copy and paste, print, or download, are against the copyright issue. This is, however, not the focus of the study, which aims to study the usability of the interface. In fact, the majority of participants mentioned that they are willing to act on the premise of protecting the copyright and use these functions moderately. For example, limit the number of page downloaded (or printed), or limit the number of text copying. Additionally, the features "font resize" and "highlight" were not available on the two platform chosen in the study, participants may misjudge the importance of the feature because of the lacking of prior experience. We recommend future research for further investigation of this issue.

This study also provides important insights for implementation. Essentially, the research proposes a series of practical recommendations for designing a better and user-preferred interface of academic e-book platform, including icons designs, layout of an interface, and a complete template of simulated platform.

At last, the researcher provides some suggestions for future research or implementation. For future research, we discovered through this study that interfaces for academic e-book platforms all have very different designs at this time; it means there is still significant room for further study before there are commonly agreed-upon design principles for academic e-book platforms. Taking the most important feature on e-book platforms, "page turn," for example, there are five different designs found in this research alone. Therefore, it is fair to say there are possibly other ways of designing this feature that might appear on platforms not included in this research. In addition, the 10 features adopted as the basis of the analysis in this research do not incorporate all features of academic e-book platforms. At this stage, at least two features, "di-

rectory links" and "bibliography maker," are not included. For the above reasons, we can see there are still lots of research areas that worth further study.

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Part 1:   Demographic Information

You are…

1. ☐ Undergraduate   ☐ Graduate   ☐ Professional Students

2. ☐ Business and Management   ☐ Foreign languages and Literatures
   ☐ Education   ☐ Liberal Art
   ☐ Engineering   ☐ International Studies

3. ☐ Male   ☐ Female

4. School: _____

Part 2:   Behavior of E-books

You use of e-book that…

5. Thinking back to the last time you used an e-book, how did you get hold of it?

   ☐ I bought a copy   ☐ I got it free off the internet
   ☐ I got it from TKU Library   ☐ I got it from a friend or colleague
   ☐ I got it from another library   ☐ I don't remember

6. How did you read the content?

   ☐ I read the contents from a screen   ☐ A bit of both
   ☐ I printed the contents and read from paper   ☐ I don't remember

7. How much of that e-book did you read online?

   ☐ I read the whole book   ☐ I skim several chapters
   ☐ I read several whole chapters   ☐ I just looked at it very briefly
   ☐ I read one whole chapter   ☐ I don't remember

8. How dependent are you on the following information resources to complete your academic assignments? (tick one box for each statement)

	Not at all dependent	Slightly dependent	Fairly dependent	Highly dependent	I don't know
Resources found on the internet	☐	☐	☐	☐	☐
Library-provided electronic resources	☐	☐	☐	☐	☐
Library-provided print materials	☐	☐	☐	☐	☐
Online course materials	☐	☐	☐	☐	☐
Your own books or lecture notes	☐	☐	☐	☐	☐

9. Have you used any of the electronic books that are available from TKU Library?

   ☐ Yes   ☐ No   ☐ I'm not sure

Part 3: Usability Questionnaire

		1	**2**	**3**	**4**	**5**	**6**	**7**	
10.	*Effective***:** It refers to the completeness and accuracy with which users achieve their goals.	bad ☐	☐	☐	☐	☐	☐	☐	good
11.	*Efficient***:** It refers to the speed (with accuracy) with which this work can be done.	bad ☐	☐	☐	☐	☐	☐	☐	good
12.	*Engaging***:** It refers to how pleasant, satisfying, or interesting an interface is to use.	bad ☐	☐	☐	☐	☐	☐	☐	good
13.	*Error Tolerant***:** It refers to how well the product prevents errors and helps the user recover from any that do occur.	bad ☐	☐	☐	☐	☐	☐	☐	good
14.	*Easy to Learn***:** It refers to how well the product supports both initial orientation and deeper learning.	bad ☐	☐	☐	☐	☐	☐	☐	good

Part 1: Instructions & Demographic Information

Part 2:   Behavior of E-books

第二部分

接著，我們將詢問您的電子書使用背景 (共5題)。
請您嘗試回想最近一次閱讀電子書的情形來回答問題。 ⟵---------- Instructions and terms

5. 最近一次閱讀電子書，當時您是如何取得該本電子書？ *
- ○ 從網路電子書店購買
- ○ 透過學校圖書館取得
- ○ 透過校外的其他圖書館閱讀
- ○ 從網際網路下載免費的電子書
- ○ 透過親朋好友取得
- ○ 不記得了

6. 最近一次閱讀電子書，當時您是以什麼方式閱讀電子書內容？ *
- ○ 直接在電腦螢幕上閱讀
- ○ 把它印出來閱讀
- ○ 在電腦螢幕上閱讀，但也同時印出來
- ○ 不記得了

7. 最近一次閱讀電子書，當時您閱讀了多少內容？ *
- ○ 讀完了整本書
- ○ 讀完了幾個章節
- ○ 讀完了一個章節
- ○ 讀了某些章節的部分內容
- ○ 大概翻一下
- ○ 不記得了

Questionnaire Part 2
(see Appendix 1)

8. 當您在寫學校的報告或論文時，您依賴以下資訊來源的程度為何？ *

	非常依賴	普通依賴	偶爾依賴	完全不依賴	不記得了
透過網際網路搜尋到的資源	○	○	○	○	○
學校圖書館所提供的電子資源	○	○	○	○	○
學校圖書館所提供的紙本資源	○	○	○	○	○
學校課堂中的指定教材	○	○	○	○	○
您自己準備的書籍或講義	○	○	○	○	○

9. 您將來會 (繼續) 使用學校圖書館所提供的電子書嗎？ *
- ○ 會
- ○ 不會
- ○ 不確定

Part 3: Usability Questionnaire – *EBSCOhost ebook Collection*

Part 3 (continued): Usability Questionnaire – *SpringerLink E-Books*
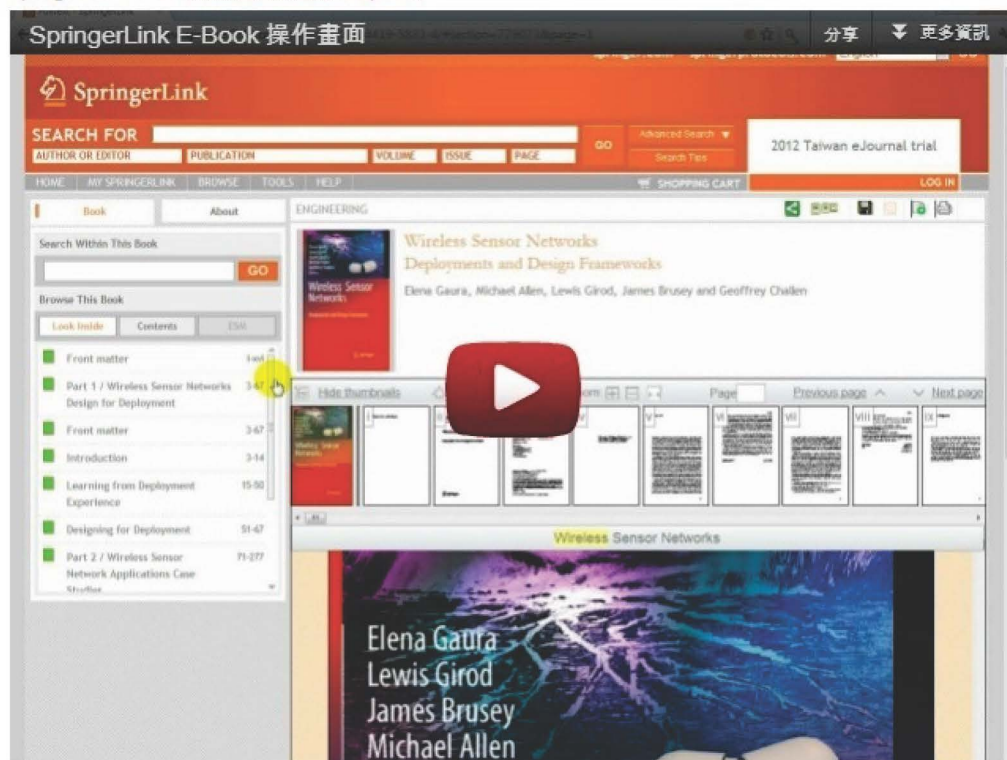
Video

Questionnaire Part 3 (see Appendix 1)

Part 4: Invite to Participate in Usability Testing

問卷已結束，送出問卷之前...
我們誠摯地邀請您參與本研究之可用性測試。
＊本研究進行期間：2012/10/1~2012/11/30
＊測試時間長度：約30分鐘
＊測試地點：淡江大學 - 文學館 L526 室
若您願意參與測試，請來信至 699000161@s99.tku.edu.tw
屆時我們將提供茶水，並贈送 統一超商禮券：100元 (名額有限)。

期待您的來信，謝謝您！

完成，送出問卷！

**A Usability Study of Online E-book Platforms in the Academic Library:
A Case Study of Tamkang University**

Researcher: Tzu-Lung Chiang   Advising Professor: Ling-Ling Lai, Ph.D.

Department of Information and Library Science, Tamkang University

Invitation to Participate: I am invited to participate in the "A Usability Study of Online E-book Platforms in the Academic Library: A Case Study of Tamkang University" research study conducted by Tzu-Lung Chiang and Prof. Ling-Ling Lai, Ph.D.

Purpose of the Study: The purpose of this study is to investigate and compare the role of online e-book platforms on the academic library website or system from the user's perspective.

Participation: My participation will consist of attending one testing and interview session for approximately 45-60 minutes during which I will be asked to complete a series of tasks of operating the two e-book platforms: *EBSCOhost eBook Collection* and *SpringerLink E-Books*. Following that, I will be asked questions by the researcher about my opinions of *EB* and *SP*. The interviews have been scheduled for

_____ (place), _____ (date), _____ (time).

Risks: My participation in this study will entail that my personal information and this may cause me to feel self-conscious about my use of the platforms. I have received assurance from the researcher that every effort will be made to minimize these risks by keeping my participation in this research confidential and anonymous.

Benefits: My participation in this study will contribute to a better understanding of the user's requirement of academic e-book platforms at the Tamkang University. My participation will also contribute to enhance performance of interface implementation on future.

Confidentiality and Anonymity: I have received assurance from the researcher that the information I will share will remain strictly confidential. I understand that the contents will be used only for the creation of a Master's thesis and that my confidentiality will be protected by the fact that only the researchers will have access to the data. Anonymity will be protected by the removal of any identifying characteristics from the data during the analysis and reporting stages.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be deleted and/or destroyed.

Acceptance: I, _____, agree to participate in the above research study conducted by Tzu-Lung Chiang of the Department of Information and Library Science, Tamkang University, which is under the supervision of Prof. Ling-Ling Lai, Ph.D.

Participant's signature: **Researcher's signature:**

Date: **Data:**

EBSCOhost eBook Collection

	ID	Copy/paste	Font resize	Highlight	Notes	Page turn	Print	Share	Search	Translate	Window resize
Expert users	E1	1 sec	fail	fail	11 sec	7 sec	fail	12	9 sec	14 sec	3 sec
	E2	3 sec	fail	fail	6 sec	1 sec	fail	19	5 sec	4 sec	9 sec
	E3	2 sec	fail	fail	8 sec	1 sec	3 sec	fail	12 sec	9 sec	1 sec
	Spend time	2.0 sec	all failed	all failed	8.3 sec	3.0 sec	3.0 sec	15.5 sec	8.7 sec	9.0 sec	4.3 sec
	Success rate	100%	0%	0%	100%	100%	33.3%	66.7%	100%	100%	100%
Intermediate Users	I1	3 sec	fail	fail	8 sec	5 sec	fail	fail	8 sec	6 sec	9 sec
	I2	2 sec	fail	fail	11 sec	2 sec	4 sec	47	7 sec	6 sec	15 sec
	I3	3 sec	fail	fail	fail	4 sec	fail	5	10 sec	13 sec	1 sec
	I4	3 sec	fail	fail	8 sec	4 sec	fail	fail	19 sec	9 sec	2 sec
	Spend time	2.8 sec	all failed	all failed	9.0 sec	3.8 sec	4.0 sec	26.0 sec	11.0 sec	8.5 sec	6.8 sec
	Success rate	100%	0%	0%	75.0%	100%	25.0%	50.0%	100%	100%	100%
Novice users	N1	2 sec	fail	fail	16 sec	3 sec	fail	fail	12 sec	7 sec	7 sec
	N2	4 sec	fail	fail	6 sec	3 sec	fail	fail	25 sec	11 sec	fail
	N3	2 sec	fail	fail	13 sec	2 sec	fail	fail	fail	22 sec	2 sec
	N4	3 sec	fail	fail	6 sec	4 sec	fail	31	6 sec	12 sec	10 sec
	N5	4 sec	fail	fail	6 sec	4 sec	fail	fail	5 sec	5 sec	2 sec
	Spend time	3.0 sec	all failed	all failed	9.4 sec	3.2 sec	all failed	31.0 sec	12.0 sec	11.4 sec	5.3 sec
	Success rate	100%	0%	0%	100%	100%	0%	20.0%	80.0%	100%	80.0%
Total	Spend time	2.7 sec	all failed	all failed	9.0 sec	3.3 sec	3.5 sec	22.8 sec	10.7 sec	9.8 sec	5.5 sec
	Success rate	100%	0%	0%	91.7%	100%	16.7%	41.7%	91.7%	100%	91.7%

SpringerLink E-Books

	ID	Copy/paste	Font resize	Highlight	Notes	Page turn	Print	Share	Search	Translate	Window resize
Expert users	E1	fail	fail	fail	fail	1 sec	fail	fail	fail	fail	6 sec
	E2	fail	fail	fail	fail	1 sec	fail	fail	fail	fail	11 sec
	E3	fail	fail	fail	fail	1 sec	fail	fail	15 sec	fail	15 sec
	Spend time	all failed	all failed	all failed	all failed	1.0 sec	all failed	all failed	15.0 sec	all failed	10.7 sec
	Success rate	0%	0%	0%	0%	100%	0%	0%	33.3%	0%	100%
Intermediate Users	I1	fail	fail	fail	fail	3 sec	fail	fail	fail	fail	13 sec
	I2	fail	fail	fail	fail	1 sec	fail	fail	16 sec	fail	5 sec
	I3	fail	fail	fail	fail	2 sec	fail	fail	fail	fail	10 sec
	I4	fail	fail	fail	fail	6 sec	fail	fail	fail	fail	23 sec
	Spend time	all failed	all failed	all failed	all failed	3.0 sec	all failed	all failed	16.0 sec	all failed	12.8 sec
	Success rate	0%	0%	0%	0%	100%	0%	0%	25.0%	0%	100%
Novice users	N1	fail	fail	fail	fail	4 sec	fail	fail	fail	fail	13 sec
	N2	fail	fail	fail	fail	3 sec	fail	fail	fail	fail	fail
	N3	fail	fail	fail	fail	5 sec	fail	fail	17 sec	fail	15 sec
	N4	fail	fail	fail	fail	3 sec	fail	fail	13 sec	fail	20 sec
	N5	fail	fail	fail	fail	4 sec	fail	fail	fail	fail	10 sec
	Spend time	all failed	all failed	all failed	all failed	3.8 sec	all failed	all failed	15.0 sec	all failed	14.5 sec
	Success rate	0%	0%	0%	0%	100%	0%	0%	40.0%	0%	80.0%
Total	Spend time	all failed	all failed	all failed	all failed	2.8 sec	all failed	all failed	15.3 sec	all failed	12.8 sec
	Success rate	0%	0%	0%	0%	100%	0%	0%	33.3%	0%	91.7%