

HOW STUDENTS USE E-BOOKS – READING OR REFERRING?

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Abstract

This paper reports a study on students' perceptions and reactions towards e-books in Higher Education (HE). During this study a Web survey and a follow-up study were conducted using students from University of Strathclyde as a sample population. The Web survey revealed that there were three different types of e-book use in an academic setting: (a) fact finding; (b) finding relevant content; and (c) extended reading. The most popular reason for using e-books was for "finding relevant content" which indicated that e-books were not read in their entirety but instead were consulted or used for reference purpose. The Web survey finding was then confirmed by the follow-up study. This study is valuable for designing a better e-book features in which they should be designed according to what purpose the e-books are used for (i.e. for reference purpose or extended reading or both). If the e-books are intended to be used for reference purpose, the features might include practical searching and browsing features, whereas if the e-books are designed for extended reading they should be provided with features that are conducive for on-screen reading such as a good layout design and navigation tools.

Keywords E-books; Electronic books; E-book usage; E-book features; Academic libraries

INTRODUCTION

The term e-book is used variously in the literature to refer to hardware, software and document content. Whereas from the user perspective, an e-book is frequently viewed as a dedicated reading device and not as the associated content, according to a survey on e-book features undertaken by Henke (2002).

The Oxford Dictionary of English (2003) also defines an e-book as "an electronic version of a printed book which can be read on a personal computer, or hand held device designed specifically for this purpose". Other researchers who do not separate both concepts in their definition of e-books are Lynch (2001), Rao (2003), Armstrong, Edwards and Lonsdale (2002), Wilson and Landoni (2001) and Chen

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(2003). For the purpose of this survey, an e-book is defined as “an electronic form of a book that can be viewed and read on a computer or portable device, e.g. Palm”.

The integration of e-books in academic libraries is beneficial as they are remotely accessible and available around the clock, potentially can led to saving physical space in the library, prevention from book lost and damage, and easier integration to Virtual Learning Environments (VLEs). However the integration also has created some challenges such as in e-books acquisition and collection development, standards and technology, and access and circulation.

Previous survey on e-book usage demonstrated low usage such as findings reported by Abdullah and Gibb (2006), Anuradha and Usha (2006), Bennett and Landoni (2005), Ismail and Zainab (2005), and Chu (2003). This was reported by limited range of available e-books, poor design, lack of awareness regarding its availability and lack of widely advertisement of this resource.

The e-book collection in a library is usually supplied by an e-book provider such as NetLibrary (<http://www.netlibrary.com>) or Ebrary (<http://www.ebrary.com>), or by book publishers such as Oxford References Online (<http://www.oxfordreference.com>) or Oxford Scholarship Online (<http://www.oxfordscholarship.com>). The providers normally supply reports to monitor overall e-book usage which are useful for collection development and circulation purposes. These reports however provide only shallow information on e-book access which is usually limited to reports on which e-book have been accessed based on the subject discipline, rather than how users actually interact with an e-book (i.e. browsing, or in-depth reading), although some providers supply reports on the duration readers use a specific e-book. As a result, assumptions are often made about features which readers find useful when viewing or consulting e-books. The reports are also not in a standard format and differ from provider to provider. It is therefore difficult to make comparisons. For that particular reasons this study, which has gathered information on how readers use and react to e-books, is important in order to get a clearer picture of users' attitudes towards e-books including the purpose of using e-books and what types of e-books features users desire in order to design more valuable and usable e-books. In addition, this study has also promoted e-books in the host university library.

OBJECTIVES AND METHODOLOGY

The main objective of this study is to investigate students' perceptions and reactions towards e-books in Higher Education (HE). In order to meet this objective a Web survey and a follow-up study were conducted using students from University of Strathclyde as a sample population.

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For the Web survey, a self-selected sampling method was employed to generate a sample of students consisting of undergraduate and postgraduate students registered with the University of Strathclyde for academic year 2005/6. The online questionnaire was designed using HTML coding and a CGI program as a front end to receive the survey data. It was then placed on a server in the department of Computer and Information Sciences at the University of Strathclyde which also acted as the repository for all collected data.

Subsequently, the follow-up study was carried out to investigate students' perceptions of e-books in more depth. The Web survey findings indicated that e-books were used in an academic setting for reference purpose and that they were not used for extended reading. This follow-up study was significant in terms of exploring how students in a HE setting interact with e-books for the purpose identified above. It has therefore involved students' interaction with e-books in the University of Strathclyde Library's collection specifically on NetLibrary platform. NetLibrary was selected for the reason that statistical e-book usage reports were available for the university library collections. This report was useful in order to select e-book titles that would be suitable for one of the search and browse tasks. For this task, the most popular title in the subject collection was selected based on a respondent's discipline. The most popular title was used as it was the most likely to be relevant to a larger number of participants. The motivation was not to study the relevance of particular content but to assess how respondents interacted in general with e-books.

For the follow-up study, respondents were asked to visit the NetLibrary e-book page via their University Library Web site and conducted several search and browse oriented task. After that they were asked to rate how easy or difficult it was to complete these tasks. At the end of the session respondents were asked to answer several questionnaires regarding e-book features, book format preferences, and adding certain e-book features to online library catalogue.

Respondents for the follow-up study were selected randomly from a list of the Web survey respondents who had agreed to participate earlier. A total of 333 respondents had indicated a willingness to participate. A systematic sampling approach was used to select every tenth respondent in the list resulting in a working list of 33 potential participants. However, a number of respondents were not able to participate within the time frame and the number of actual participants was 18. This number is considered sufficient based on the 'discount usability testing' concept, suggested by Nielsen in 1989 (Barnum et al. 2004).

RESULTS AND DISCUSSION

Demographics

A total of 1,372 responses were returned in the Web survey out of a target population of 13,568, representing a 10% response rate. The target population consisted of all undergraduate (10,831) and postgraduate (2,737) instructional students registered in academic year 2005/6 in University of Strathclyde, Scotland. The Web survey showed that 54% of the respondents were female and 45% of them were male, with the remainder declining not to answer the question. The majority of the respondents (90%) were undergraduate students, with only 10% of them being postgraduate students. This is in line with the composition of the target respondents: 80% were undergraduates and only 20% of them were postgraduates. The students were categorised by their disciplines based on different faculties in the University of Strathclyde: law, arts and social sciences, business, science, engineering and education. The responses were spread quite evenly across these disciplines with the highest number (29%) coming from the law, art and social science and the lowest (6%) from the education.

Consequently the follow-up study involved 18 respondents out of 33 participants in which representing 55% response rate. The respondents were evenly distributed between male and female. The majority of the respondents (72%) were postgraduate students, with a minority (28%) of them being undergraduates. The responses were spread across disciplines which were categorised as business, social science, medical science, and science; with the highest (72%) coming from the sciences and the lowest (6%) from the social sciences. When asked whether they had ever used e-books before the survey, half of the respondents (50%) answered 'yes' and half of them answered 'no'.

Purposes for using e-books based on the Web survey

The Web survey revealed that students selected "to find material for a project or essay" as the main purpose for using an e-book, with "to support research work" being the second most popular choice. The least selected option was "other" which, from comments, was primarily reading for pleasure and leisure. Based on the six purposes of using e-books identified in the Web survey, this study has categorised e-book use into three main purposes (see Table I):

- i. Fact finding: this involves the use of e-books to find a very specific piece of information or a fact (e.g. using a dictionary or an encyclopaedia).
- ii. Finding relevant content: this involves the browsing and searching of e-books for relevant chunks of information which may be integrated with other information chunks to form a summary of a topic (e.g. browsing and

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searching relevant contents of textbooks, manuals or instructional books, conference proceedings or reports).

- iii. Extended Reading: this involves reading e-books in their entirety or large sections such as chapters to get a broad view or summary of a discipline or school of thought (e.g. reading a textbook or recommended course book).

Table 1: Purposes for which E-books are used

For what purpose did you use these e-books? (n=549)	Count of Responses	Responses (%)
1. Fact Finding:		
i. To look up the answer to a specific question	190	16.2
2. Finding Relevant Content:		
ii. To find material for a project or essay	435	37.1
iii. To support research work	251	21.4
3. Extended Reading:		
iv. To read as a textbook for a course	136	11.6
v. To read as a recommended course book	108	9.2
Other	53	4.5
Total	1173	100.0

Note: 4 missing cases; 545 valid cases.
A respondent could select more than one reason.

Table 2 below summarises how respondents used e-books for three main purposes: (a) fact finding (this includes option i in Table 1); (b) finding relevant content (this includes any combination of options ii and iii in Table 1); and (c) extended reading (this includes any combination of options iv and v in Table 1). The finding indicates that the most selected purpose for using e-books is for ‘finding relevant content’ (59%). However, it is quite unexpected that higher responses indicate using e-book for ‘extended reading’ (21%) rather than for ‘fact finding’ which indicates only 16%. This is in contrast with some of the respondents’ comments that reading on screen for extended periods were uncomfortable. A possible explanation for this probably because of no equivalent printed book was available as highlighted by some students in their comments that they have to use e-books through EEBO (Early English Books Online) simply because ‘there was no equivalent printed book available’.

Table 2: Three Main Purposes for Using E-books

Four Types of E-book Use (n=549)	Count of Responses	Responses (%)
1. Fact Finding	190	16.2
2. Finding Relevant Content	686	58.5
3. Extended Reading	244	20.8

Note: Respondents could select more than one option

Follow-up study

The Web survey findings indicated that e-books were used in academic setting mainly for “finding relevant content” (which is termed as ‘for reference purpose’ afterwards) and they were not used for extended reading. Therefore a follow-up study was conducted to explore how students in an academic setting interact with e-books for this purpose in depth. Hence, this study involved the use of search and browse oriented task with respect to e-books in a university library collection which involved interaction with e-books on the NetLibrary’s platform. The follow-up study also gathered information regarding desired e-book features, book format preferences, and opinion on adding certain e-book features to online library catalogue.

(a) Search and browse oriented tasks

Figure 1 presents data related to evaluation of the searching and browsing tasks. As can be seen from the bar chart, there were four tasks which were most rated as “4 - very easy” to perform with an average rating of from 3.4 to 3.6 (which are tasks i, iii, iv and v). Only one task, “zooming out and in the e-book page”, was most commonly rated as “1 - very difficult” but on average it was rated as 2.2.

Tasks (i), (ii) and (iii) were similar in terms of types of task but tasks (i) and (iii) were mainly rated as “4 - very easy” and the average ranged from 3.4 to 3.6 while task (ii) was mostly rated as “3 - easy” with an average rating of 2.9. A possible explanation is that tasks (i) and (iii) required participants to use a Basic Search function which was very straightforward. Task (ii) on the other hand was quite challenging (especially for respondents who were first-time users) which required them to use an Advanced Search function.

For tasks (iv) and (v), respondents found that they were “4 - very easy” with task (iv) being rated slightly more towards the positive scale on average (3.6) compared to task (v) (3.4). This might be because the Table of Contents is usually at the top of the tool palette in the NetLibrary Online Reader so that users can easily notice it, while

the index is frequently at the bottom and sometimes users need to scroll the palette down to find it, especially when there are long chapter headings.

Task (vi) on the other hand was rated fairly similar on average (3.2) and on mode responses (“3 - easy”). This is possibly because both versions of e-books incorporate a similar navigation feature for going to a specific page number in an e-book.

Task (vii) was most commonly rated as “1 - very difficult” although the average rating tended towards a “2 - difficult” rating (2.2). This is possibly because there are two different e-book formats (full-text and pdf) displayed in the NetLibrary Online Reader which provide different navigating tools of which one is highly visible and the other is not. In addition, it has been observed that this task involved 15 e-books in full-text format while only 3 e-books were in PDF format. This was not controllable as the e-books were selected based on the participants’ disciplines.

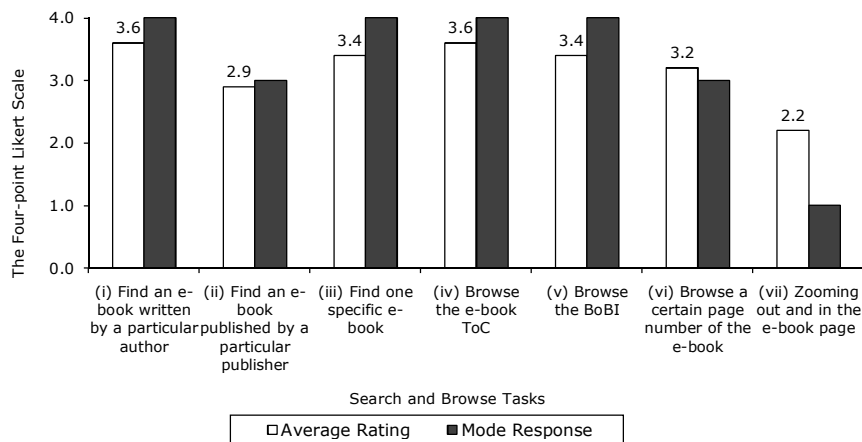


Figure 1: Comparison between Average Rating and Mode Responses of Search and Browse Oriented Tasks

(b) E-book features

In the early development of e-books, Landoni and Gibb (2000) suggested that the paper book metaphor plays an important role in e-book design for enhancing text readability and user acceptance. Consequently, Henke (2003) discovered that users no longer wanted an e-book to have only paper-book features but they also wanted an e-book to include non-paper-book features and take advantage of the electronic environment to improve their usage. One significant advantage of an e-book, when compared to its paper counterpart, is the ability to search and browse information

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more effectively and efficiently through hypertext links and search tools. With the emergence of e-book aggregators (such as NetLibrary and Ebrary) who collect e-books from different publishers and make them available to users, the functionality of e-book search features should be expanded from searching features within an e-book’s content into features to search and browse a collection of e-books. Therefore this study has assessed e-book features which specifically address collection browsing and searching.

Table 3 shows how useful collection browsing e-book features were rated. It indicates that only one collection browsing feature was rated as “4 - essential” by respondents which were “Full-text search across the catalogue of e-books” with an average rating 3.5. The majority of the other features (5 out of 7) were mostly rated as “3 - useful” with an average rating from 2.8 to 3.3 (features 1 - 5).

It is interesting to note from the findings that the “Most Popular e-book” function was rated as “3 - useful” and “2 - marginally useless” in equal numbers for each. One possible explanation might be that this function is not often used in an academic setting where the decision to use an e-book is not based on its popularity but on its relevance. Therefore it is logical to observe that on average the rating was towards a positive side of the scale (2.7).

Table 3: Rating of Usefulness of Collection Browsing Features in an E-book

Shelf Browsing Features (n=18)	Mode Response	Average Rating
1. Full-text search across the catalogue of e-books	4	3.5
2. “Find Related Book” function – which provides links to additional titles on the same subject	3	3.3
3. Creating a personal bookshelf of e-books for your study or research	3	3.3
4. “Artificial bookshelf” function- which users can use for browsing	3	3.1
5. “New Arrivals” function - which displays e-books which have been added recently to the collection	3	2.8
6. “E-book circulation information” function – which provides users with information such as frequency of being checked-out, estimated return date, etc	3	2.8
7. “Most Popular e-book” function – which allows users to view the most popular e-books in the collection	2	2.7

1-4 scale where 1=very difficult, 2=difficult, 3=easy and 4=very easy
 Mode response: The most frequent response

(c) Book format preference

Previously Langston (2003) reported that 62% of his respondents preferred paper-books and 38% preferred e-books if given a choice between both. This is in line with Perry (2005) with a higher percentage of her respondents (84%) also preferring to use printed books. These two studies however did not consider different purposes that might influence users’ preference, as has been undertaken in this study. This study identified three main reasons for using e-books that might influence user preferences between e-book and printed book.

As can be seen in Figure 2 below, the results indicated that most of the respondents preferred to use a printed book (94%) for “extended reading”. In addition a majority of respondents preferred to use an e-book both for “fact finding” (67%) and “finding relevant content” (50%). These findings showed that e-books are considered most appropriate for reference purpose rather than extended reading.

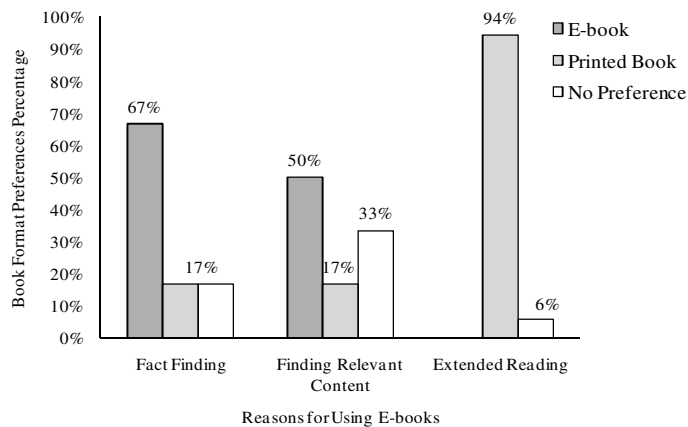


Figure 2: Comparison between Book Format Preferences with Scenarios of Using E-Book

(d) E-book usage versus book format preferences based on three main reasons of e-book use

Figure 3 compares the mode responses of book format preferences and e-book usage in an attempt to investigate user preference trends. From the bar chart, it can be seen that all of the respondents, whether they had used an e-book or not, preferred to use a printed book for “extended reading” respectively. On the other hand, for the “fact finding” and “finding relevant content”, respondents preferred to use an e-book (100% and 86% respectively). This shows that respondents

acknowledged that e-books are more practical than paper books for searching information.

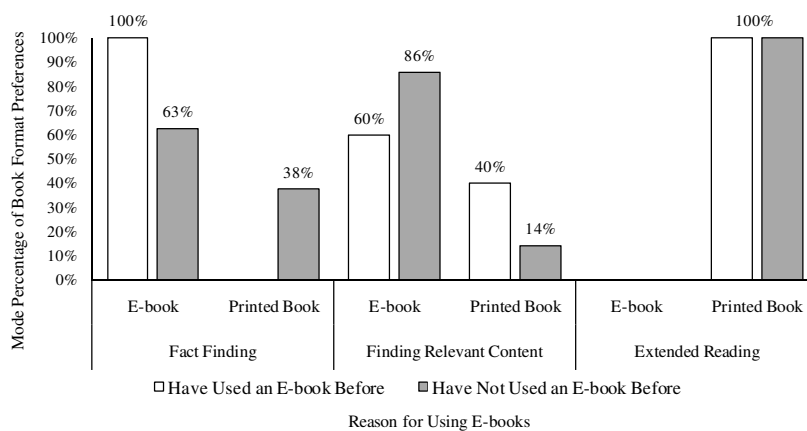


Figure 3: Comparison between Respondents’ E-book Usage with Book Format Preferences

However, it is important to highlight from the findings that 86% of the respondents who had not used an e-book before the survey rated their preference of using e-books for “finding relevant content” as compared to those respondents who had used an e-book prior to the survey (60%). A rational explanation might be that the respondents’ attitude towards e-books changed after being exposed and interacting with e-books in an operational environment during this study.

It was expected that students’ book format preferences probably were influenced by respondents’ prior experience of using e-books before the survey. Therefore a Chi-squared test was performed to determine whether any association existed between e-book usage and respondents’ book format preferences for different scenarios of using e-books. The test revealed that there were associations (with $p < 0.001$) between e-book usage and book format preferences (as shown in Table 4). The implication of these associations is that both types of respondent (who had and had not used an e-book before the survey) preferred to use printed books for extended reading (to read as a textbook), while they preferred to use e-books for reference purposes (looking up facts or relevant information) as shown in Figure 3.

Table 4:. Chi Square Test Result for E-book Usage versus Respondents’ Book Format Preferences

Have you used an e-book before the survey?	N of Valid Cases	Value (Pearson Chi-square)	df
Have you used an e-book before the survey? (Yes)* Respondents’ book Format Preferences	25	18.657	2
Have you used an e-book before the survey? (No)* Respondents’ book Format Preferences	31	17.661	2

(e) Adding certain features to an Online Library Catalogue

McCarty (2001) highlighted in his study that an e-book was often used as a sample to determine if a paper book was worth buying or borrowing. This is because e-books are usually provided with browsable and searchable back-of-the-book index and table of content that operated as additional access points to locate relevant book content. Therefore this study has explored students’ attitudes as to whether certain features should be added to an online library catalogue (e.g. browsable and searchable back-of-the-book index and table of content) to help users to find relevant books before they proceeded to borrow them from a library. Furthermore, in general browsing and searching for books in libraries are currently being done using title, author name, subject keyword, or DDC (Dewey Decimal Classification)/UDC (Universal Decimal Classification) class number (which only provides a little information on their contents). For that reason it is important to make those features accessible via the online library catalogue to improve users’ opportunities to browse and search for relevant book content.

Figure 4 shows the degree to which respondents agreed or disagreed that certain e-book features should be included in an online library catalogue. This survey revealed that a majority (61%) of the respondents “strongly agreed” that a browsable and searchable BoBI (Back of Book Index) feature should be included while 56% respondents had the same opinion on including browsable and searchable ToC (Table of Content) in an online library catalogue. More than two-thirds of them (72%) “agreed” that images of the front cover of books should be provided. The respondents however most commonly “disagreed” (44%) that images of book spines should be included. This is possibly because respondents might not see that this

feature was as useful as a browsable and searchable BoBI and ToC due to the fact that it only provides a visual image of book that is helpful to locate the book on a physical shelf and not to locate relevant book content.

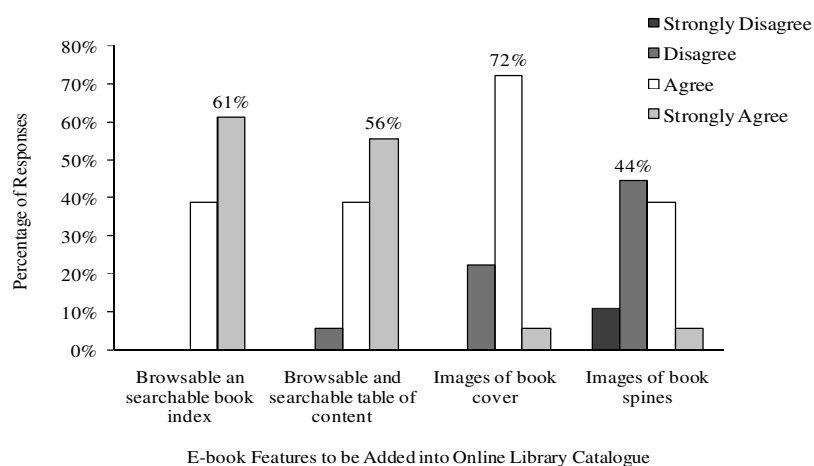


Figure IV: Percentage of Responses regarding whether Certain E-book Features should be added to an Online Library Catalogue

CONCLUSIONS

The Web survey revealed that there were three different types of e-book use in an academic setting: (a) fact finding; (b) finding relevant content and (c) extended reading. The most popular reason for using e-books was for “finding relevant content” which indicated that e-books were not read in their entirety but instead were consulted or used for reference purpose. The Web survey finding was then confirmed by a follow-up study. On the whole, both studies reported here are useful for designing a better e-books features in which they should be designed according to what purpose the e-books are used for (i.e. for reference purpose or extended reading or both). If the e-books are intended to be used for reference purpose, the features might include practical searching and browsing features, whereas if the e-books are designed for extended reading they should be provided with features that are conducive for on-screen reading such as a good layout design and navigation tools.

This study furthermore demonstrated that students had a positive reaction if certain e-book features (i.e. browsable back-of-the-book index and table of content and full-text search tool) accessible via the online library catalogue to improve users’ opportunities to browse and search for relevant book content. Based on this, a study

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was conducted focusing on measuring the usability of these features as access points to find relevant content of books. This was done using several e-books because these features are only encountered in an e-book environment. The findings however are not reported in this paper.

To summarise, the response rate for the Web survey was high in terms of volume and trends can be viewed with some confidence. However, for generalisability, the results should be compared with those from other libraries, using a stratified sampling method to generate an equal proportion of respondents in terms of their level of studies and academic disciplines. It is important to note that this Web survey was dependent on respondent self-selection. This meant that there was no central control over the return of sample profile (e.g. gender, level of studies, academic discipline). The follow-up study was in addition important in that it gave the opportunity to respondents to interact with e-books in an operational environment before giving their judgement on how easy or difficult they were to use and before rating their preferences. This method was strengthened by combining it with a talk-aloud technique that allowed respondents to describe how they interacted with the test materials and to identify reasons for any difficulties encountered. Furthermore there are very few studies of this type in the literature and they tend to be limited to a specific subject area such as Appleton's (2004) study which reported on particular e-books from NetLibrary and Ebrary that have been used in support of midwifery education at the Faculty of Health within Edge Hill College of Higher Education, Liverpool UK.

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