

## E-Book As Learning Tool: A Review And Focus For Future Research

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### ABSTRACT

This is a conceptual paper to study the use of e-book as a learning tool. The study reviews literature on the basic concepts of e-books. The paper discusses and analyses on previous studies about e-book and its use in education especially in teaching and learning process. The findings include multiple definitions of e-book, the limitations and advantages that appears to be the most influential in its use in the learning process and whether users perceptions of e-book use has changed over time. This paper ends with discussions on the existing gaps in e-book research and suggestions for future research on how e-book could be used and explored as a teaching and learning tool.

**Keywords:** e-book, teaching and learning, tool

### INTRODUCTION

E-books are the most important development in the world of literature after Gutenberg and are forecast to change the reading habits over the next several years (Rao, 2001). As a new developing technology, the e-book had a bumpy start with limited success in the past, and there are still lack of standards in platforms (Bry & Kraus, 2002; Lee, Guttenberg & McCrary, 2002), business models and metadata that need to resolved (Pomerantz, 2010; Rao, 2005).

However, previous researches have shown that the growth rate in the production and demand of e-books has grown by approximately 20 per cent in the last few years (Just, 2007; Alvite Diez & Rodriguez Bravo, 2009). Furthermore, the sales statistics offered by both American Publishers Association (APA) and International Digital Publishing Forum (IDPF, 2009; APA, 2009) confirmed this trend of increasing sales with a very significant growth last years. These figures seems to indicate that e-book is increasingly accepted (Pomerantz, 2010) and authors such as Sharp (2005) and Underwood (2010) have even identified e-book as wave of the future and will simply be adopted by younger generations.

The rapid growth of e-book sales along with the use of computer-based learning materials has gradually challenging the supremacy of books in education (Garland and Noyes, 2005). The use of these learning materials increases the potential of using e-books as learning tools as suggested by a report from the Scottish Executive Education Department (SEED, 2002). The report suggests the use of computer and technology within curricular areas as a mean to support learning and teaching. This view is also supported with another research by Passey, Rogers, Machell and Mchugh (2004) which claims that in order to maximize enthusiasm among students, computer and technology needs to use not only in subject-specific ways but also to embed in both the teaching and learning process.

The aim of this paper is to explore the basic concept of e-book, followed by earlier studies on e-books which discussed the limitations and advantages of using e-book as a learning tool. The author does so through extensive literature review from major journals from all over the world. At the end of the paper, the author will suggest gaps of current research and arrange for directions for future research.

## **BASIC CONCEPT OF E-BOOK**

The introduction has stated that e-books are becoming a growing trend among readers all over the world. Is there a common definition of e-book as described in the literature? What do we understand about e-book and how does e-book differ from the printed book? This section focuses on providing explanations to the questions from the different perspectives available in the literature review.

The author made various attempts in the literature to define the e-book. Naturally, these definitions mainly follow the mainstream dimension of book evolution which is digitization that started since Project Gutenberg in 1971. Therefore, many authors (such as Lynch, 1999; Rao, 2003; Saurie & Kaushik, 2001; Cox & Mohammed, 2001; Lee, 2002) refer e-book as a text that is available in the electronic format. However, this is a very broad definition to consider with the evolving technological landscapes around the 21<sup>st</sup> century.

Although the idea of e-book has existed since 1960s, there is still much confusion about a basic definition of an e-book (Gold Leaf, 2003; Tedd, 2005; Bennett & Landoni, 2005). Hughes (2003) has stated that the e-book definition has been the subject of renewed interest, “involving more complexity than that of merely any digital text read via a glass screen”. While, Carreiro (2010) suggested that the unsolidified definition surrounding e-book is the cause of this problem. Consequently, an understanding of the term book may be an ideal starting point in order to further understand the term e-book.

According to Rao (2001), the term book denotes both message (words and images) and medium (bound paper). In principle an e-book is quite similar to a print book which the medium is different either paper or electronic (Van der Velde & Ernst, 2009). Ardito (2000) describes how Andries Van Damm coined the phrase “electronic book” in 1967 as the concept that refers to both the electronic content and the computerized device used to store and retrieve the content. In summary, there are three basic elements that define e-book (Lynch, 2001); content, hardware and software which would be used as a baseline for further explanations in the following sections.

### **Content of e-book**

The transformation of paper book into digital e-book allows reduction of hundred pages of a book into a one-page screen. This characteristic offers the possibility of delivering knowledge that is cheaper, faster and more effective. The content of e-books maybe can be different from books and not tied to a physical object for representation or distribution (Wilson, Wilson & Gibb, 2000; Hillesund, 2001). This section will elaborate on the content element which is usually intertwined with software element through their types, format, and available features.

Various authors (such as Barker, 1999; Crawford, 2000; Anuradha & Usha, 2006) suggested that contents play a vital part to differentiate the types of e-book. Among the different types of e-book mentioned by Barker (1999) included (a) textbooks which contain linear text; (b) picture books which contain various sorts of static pictures; (c) talking books which depends primarily on the use of audio narrations and sound effects; (d) moving picture books which contains different types of motion pictures; (e) multimedia pictures which is the combination of three media elements such as text, sound and picture; (f) polymedia books which involve the use of several different media types; electronic and non-electronic media; (g) hypermedia books which is very similar to multimedia books and embeds non-linear information structures; (h) intelligent e-books; (i) telemedia books; and (j) cyberbooks.

Apart from the different types of e-book, contents of e-book can also be in different formats such as PDF, HTML, LIT or RTF (Norshuhada, Ladoni, Gibb & Shahizan, 2003). These different formats are commonly referred to as the software that enables various e-books file format to be displayed and used. Among the well-known formats are mentioned by Cavanaugh's (2005) as the “Big Five” which includes plain text (TXT), web

(HTML/XML), Adobe Reader (PDF), Microsoft Reader (LIT) and eReader (PDB). This makes the content of e-book much more versatile and flexible than the traditional printed book. In addition, it also enables content of an e-book to be indexed and easily searched through search engines, the library catalogue or the publisher platform.

In terms of content features or innovativeness, Landoni, Catenazzi and Gibb (1993) has investigated whether the usability of electronic contents can be increased further by altering the presentation of the content to suit the electronic medium. Another form of innovativeness for e-book is the “augmented book” (Yang, Cho, Soh, Jung & Lee, 2008; Dünser & Hornecker 2007; Grasset, Dünser & Billinghamurst 2008; Ucelli, Conti, Amicis and Servidio 2005; Park and Woo 2010; Farbiz & Cheok, 2005) which is augmenting a book experience by adding some dimensions or functionality to the traditional book or e-book. Currently, there have been researches on building 3D model of e-books for more natural and convenient reading (Chu, Bainbridge, Jones & Witten 2004; Hong, Chi & Card 2005; Almeida, Cubaud, Dupire, Natkin & Topol 2006). However, the limitation of current innovations in e-book is that most e-books only transform the two dimensional pages of the paper book into two-dimensional electronic book.

### **Accessibility of e-book**

Recent development in e-book is the emergence of e-book hardware and services integrated as a product service system. The integration has influenced authors (such as Goh, 2002; Lynch, 2001) to indicate e-book as the combination of electronic text and electronic reading device (the medium used to read the document content). Consequently, other authors (such as Lynch, 1999; Wilson & Landoni, 2001) have also mentioned a move towards a more flexible hybrid system which enable transformation of portable computer to an e-book reading device. The next section will elaborate more on the hardware element of e-book in terms of the e-book reader and the accessibility models.

According to Cavanaugh (2003), e-book readers are devices that serve as hardware for e-books and reading materials. Basically, these e-book readers are the devices used to read e-books; these could be handheld or not, dedicated or not; the software that enables the display of e-books on PCs or other devices may be referred to as e-book reader software, even though some software companies such as Microsoft refer to their applications as readers (NetRead, 2000). Most e-book readers are associated with publishers such as Amazon.com’s Kindle, Barnes & Noble’s Nook, Apple’s iPad with iBook.

The four major accessibility model of e-book as mentioned by authors (such as Rao, 2004; Hawkins, 2000; Anuradha & Usha, 2006) are;

- a. e-books can be downloaded by readers to their computers without any special requirements or the need of using special reading devices ;
- b. dedicated e-book readers requires dedicated hardware device with a high-quality screen and special capabilities for book reading;
- c. web-accessible e-books are e-books with contents that are published on provider’s Web site and may be accessed for a fee or purchase books to receive indefinite access ; and
- d. print-on-demand books are e-books with contents that are stored in a system connected to a high-speed, high-quality printer and bound copies are produced on demand.

We can therefore conclude that there are so many definitions of e-book that emerges from the basic concept discussed such that no definitive answer is possible. In addition, the term e-book is often used simultaneously to describe content, software and hardware. However as noted by Rao (2001) "Any definition of terms would be slightly problematic until technology and practice settle down long enough for language to catch up".

### **THE USE OF E-BOOK FOR TEACHING AND LEARNING**

Although early forms of electronic books have been available for almost two decades, studies examining how students interact with and respond to e-book texts are still few and results are somewhat conflicting (Larson, 2010). Exploring the potential use of e-book in the teaching and learning process, researchers have studied who, how, where, and why they have been used.

There have been numerous studies of who uses e-books. Fasimpaur (2004) proposed that students find e-books to be "a new and unique medium" and as a result students often read more when having access to e-books. E-book have been used by young readers (Doty, Popplewell & Byers, 2001; Grimshaw, Dungworth, McKnight & Morris, 2007), undergraduate students in nursing (Appleton, 2004, 2005), economics, and literature (Hernon, Hopper, Leach, Saunders & Zhang, 2007), students in the humanities (Levine-Clark, 2007), graduate students (Vernon, 2006; Letchumanan & Tarmizi, 2011; Rowlands, Nicholas, Jamali, & Huntington, 2007) and were most popular among academicians, and both special libraries and public libraries (Armstrong, Edwards & Lonsdale, 2002; Berglund et al., 2004; Blummer, 2006). Consequently, e-book has been used in the teaching and learning process by various types of students and academic institutions.

There have been contradictory results from studies about students' comprehension and learning through reading text on a computer screen, as compared to reading text from a printed page. Studies by De Jong and Bus (2002, 2003) demonstrated that reading text on a computer screen is less effective. However, studies done by Doty, Popplewell and Byers (2001) mentioned that reading text on a computer screen gives a more effective result in terms of student comprehension and learning. Finally, studies by Annand (2008), Maynard and Cheyne (2005) and Grimshaw et al. (2007) did not find any difference in both methods being studied. The contradictory findings emphasize the need for further research on the impact of electronic book and electronic text on the overall learning experience.

Studies have focused on finding the purpose of using e-book among readers. The result clearly shows that readers mostly use e-book as an added learning tool. According to Noorhidawati and Gibb (2008), students use e-book for four main purposes; fact-finding, finding relevant content, selective reading and extended reading. Their findings show that most popular reason for using e-book is "finding relevant content" which is in line with Gunter (2005) who stated that early e-book usage was primarily for reference work and not reading for leisure and entertainment. The second most popular reason was for "selective reading". This would shows that e-books are not read in their entirety but instead are search for or used for reference purposes. This observation is supported by Letchumanan and Tarmizi (2011) study that shown that students prefer to use e-books for their research work than as course textbook as e-books are easier to find and easy to manage for their research work.

Previous studies have concluded the usability of e-book among various groups of readers. However, careful attention should be given to e-book effect on different age groups. Furthermore, most of the researchers consolidated on the use of e-book as additional reference tool as opposed to being the main textbook. The following section will focus on studies regarding the potentials of e-books especially in the teaching and learning process.

### Potentials of e-books

In order to find the potential of e-books, several studies are reviewed. E-book is mainly seen as an effective learning supplement which has the ability to increase students' previous knowledge and motivation. Furthermore it could also provide attractive and interactive supporting features along with fast and large available resources of information to be used by students in both their leisure and academic activities.

Cavanaugh (2003) stated that educators and technologist have started to consider the possibilities of e-books as a realistic, potentially effective medium for learning. Appleton (2005) quoted, "With printed textbooks being well integrated into traditional teaching and learning in higher education, the next obvious resource to embed into virtual learning would be the e-book". This view is being seconded by Rothman (2006) who quoted "If ever a promising technology existed for education and distance learning in particular it would be e-books". In a more recent study that was carried out by the JISC e-book observatory project between June 2008 and June 2009 in which more than 40,000 students took part, the participants considered e-books as an excellent reference tool, a supplementary reference or as a complement instead of an autonomous solution (Stelle & Woodward, 2009).

Recent statistics (International Digital Publishing Forum, 2011) indicate that educational e-books are positioned for rapid growth as digital texts become prevalent (Guess, 2008a, 2008b). Hence, e-books have predominantly been used by both average consumers and students for pleasure reading and leisure reading (Rowlands et al., 2007). As a result, students may have prior experience using e-books while enrolled in higher education institutions, which is important because prior knowledge facilitates the learning process (Levine-Clark, 2006; Rowlands et al., 2007). However, this finding contrasts with other researches where a majority number of students had no prior experience in using e-book prior to the conducted studies (Noorhidawati & Gibb, 2008; Ismail & Awang Ngah, 2005; Chu, 2003; Bennett & Landoni, 2005; Anuradha & Usha, 2006).

The use of e-books can increase students' motivation. Most educators would agree on the fact that current students only read books in order to pass an exam or solve assigned homework problems. In other words, there is little motivation or interest for students to read a printed book compared to e-book. According to Miller (2005) students are quick to adapt the concept of digital learning, multitasking with computers, integrating self-instruction, enhancing instructors' expectations of the assignments and motivating them to learn more.

Younger generation typically welcome e-book as they feel more comfortable with the additional features offered by e-book such as abilities to search and highlight text, make notations and to bookmark pages and dictionaries (Hodas et al., 2001; Rao, 2003). Moreover, electronic textbooks include video and interactive elements that significantly enhance the electronic textbook as learning and teaching tool. Sharp (2005) who explored the use of electronic textbooks in a university setting also recommend this in his article. Fordham College also conducts a similar study with undergraduate biology students (Simon, 2002). In terms of satisfaction, majority of student stated that they would recommend using e-books in college courses to a friend, and the remaining stated that they wished other courses also offer e-book materials for student.

Other authors such as Noyes and Garland (2006) have further suggested that system developers and interface designers together with the educators should pay more attention to the usability features of the computer because their study revealed that respondents liked the interactive element of using computers. The e-book remote access, easy usage within a virtual learning environment and allowing multiple readers to be able to use it anytime, anywhere (Appleton, 2004; Long, 2003; Rao, 2003). According to Cavanaugh (2002), this enables accessibility, giving professionals or teachers the ability to access the materials without having to rework or modify the content into another medium.

Another aspect of e-books that has the most potential is the amount of available materials. Cavanaugh and Cavanaugh (2008) mentioned that there are over 240 e-book libraries that support thousands of titles. The vast level of availability allows educators to leave the costly and quickly outdated traditional textbook materials for free and accessible electronic materials (Cavanaugh, 2004; Weber & Cavanaugh, 2006). This move could serve as a positive, economical-solution for students and create a positive impact on current conception and the use of the e-book in teaching and learning.

### **Challenges in adopting e-books in teaching and learning**

E-book as with other technological innovation is not without limitations. The current challenges in adopting e-books in teaching and learning from the literature includes user preferences to the printed book, lack of navigational interaction due to poor design factors, user attitudinal preference of traditional printed books, visual problem faced by readers when reading the e-book and the similarities of current e-book design with the old and traditional printed book metaphor. Several authors (Appleton, 2004; Anuradha & Usha, 2006b; Ismail & Awang Ngah, 2005; Roesnita & Zainab, 2005; Vernon, 2006; Chong, Lim & Ling, 2008; Noorhidawati & Gibb, 2008, Noyes & Garland, 2006; Woody & Baker, 2010) have explored the differences between printed books and e-books. The findings indicated that students found e-books were not an effective learning material compared to printed books (Appleton, 2004). Several reasons for the low usage identified with the main reason as being students preferences by using printed books compared to e-book (Anuradha & Usha, 2006a; Ismail & Awang Ngah, 2005; Roesnita & Zainab, 2005; Noyes & Garland, 2006; Liu, 2006; Slater, 2009). These preferences confirmed through results of studies (Malama, Ladoni & Wilson, 2005; Wilson, Ladoni & Gibb, 2000) which indicate e-books that adherence to the paper books metaphor increases users' subjective satisfaction and overall usability of the e-books as users' expectations from e-books which inherited from their experience with printed books.

Authors have also mentioned other reasons such as lack of user friendliness (Noyes & Garland, 2006), cost, the relative quality of content and lack of promotion and encouragement of use (Appleton, 2004). Ismail and Awang Ngah (2005) described the lack of knowledge on how to use e-books as the reason of low usage. Chong et al. (2008) proceedings paper which discusses the Multimedia University e-book provision program in Malaysia has identified hardware and onscreen design factors such as troubles in installing specific reader, difficult to read from a computer screen, troubles in downloading the e-books and slow loading speed are hindering many users from using e-books. The authors also mentioned onscreen design problem such as difficult to navigate through the e-book (Vernon, 2006), difficult to scan from the e-book and difficult to find relevant information also discouraging many from using e-book. Other factors are time constraint and variety of study strategies (Vernon, 2006).

In a follow up study by Noyes and Garland (2006), the participants mentioned that they prefer to read from printed books because the pages of a book are easier to move through, less complicated, easier to annotate, highlight, bookmark, easier to digest, follow and understand. Moreover, many respondents also stated that they prefer to use book because of the tradition where they noted that they have been brought up with book and more familiar with the book. Meanwhile, many of the respondents stated that they prefer not to read from computer because of the visual problem and the information provided is not reliable as compared to reading from printed books.

This visual problem has also been mentioned by other authors (Blummer, 2006; Hernon et.al, 2007; Levine-Clark, 2007). They argued that most e-book readers only read short sections of e-books rather than reading the whole complete text online. This finding is in tandem with Vernon (2006) which revealed that online reading was physically more strenuous for students as opposed to reading a traditional textbook and prior studies which have shown that level of content assimilation for online reading is lower (Example: Dillon &



Gabbard, 1998; Bellaver & Gillette, 2004; Landoni & Hanlon, 2006; Kang, Wang & Ling, 2009) and level of cognitive load is higher (Wästlund, Reinikka, Norlander, & Archer, 2005). While author such as Clyde (2005) is concerned that students might face difficulties in understanding the content which being read in a digital form. Letchumanan & Tarmizi (2011) study found that participants found that reading through screen affects their retention of subject content, that it is having difficulties to recall the content when reading through the screen.

In a recent research, Woody and Baker (2010) and Schreibman and Siemens (2008) mentioned that reading pattern and eye movement also influence user preferences towards e-books. Woody and Baker (2010) stated that, although e-books tend to mimic printed books, but user will not read e-books the same way as they read printed book. The authors stated that readers often browse computer based text and read the text in "F" pattern to search for key terms rather than reading line-by-line (Nielson, 2006). Schreibman and Siemens (2008) also suggested that e-book developers should take into consideration factors such as long line of text when designing an e-book.

E-books have generated interest in educational settings with publishers have increasingly been producing e-textbooks and other electronic course materials for various disciplines, such as chemistry, physics, computer science, history and mathematics (Crescenzi & Innocenti, 2003; Dyllick, 1997; Simon, 2001; Wilson, Landoni & Gibb, 2002). The current e-book used however have been criticized mainly because of the e-book adhere to the traditional book metaphor and do not take advantage of the interactive possibilities afforded by computer technology (Alessi & Trollip, 2001; Maři et al., 2002).

#### **SUGGESTIONS FOR FUTURE RESEARCH**

A preliminary review of the available literature reveals many recent hypes, activities and comments but still little in research, especially in the idea of e-book being used as a learning tool. Potential results from previous research (such as Stelle & Woodward, 2009; Letchumanan & Tarmizi, 2011) give clear directions for such future research. Furthermore, prior literature also suggests the use of college students as an ideal starting point for studies involving technology such as e-book (Wilson, Ladoni & Gibb, 2000; Wearden, 1998) for several observable reasons. This includes the amount of time they spent on textbooks, their need for rapid access to large amount of information, and their level of computer literacy.

In term of the overall reading process, academic reading is much more involved when compared to the leisurely readers. As an academic reader, students need to comprehend the reading content by connecting with schemata or mental models of prior knowledge previously stored in the semantic memory (Anderson & Pearson, 2002; Ausubel, 1968; Bartlett, 1932). Hence, Foster and Remy (2009) suggested that, "as e-books supplant paper ones, higher education leaders must take a lead in shaping the future of e-books, because the practice of reading is critical to our mission". Therefore, it is very important to differentiate between the reading needs of academic students versus casual readers because the cognitive load tends to be more concentrated for purposeful academic readers than for casual readers. A review of the literature indicated that few empirically based studies conducted determine the effects of students' cognitive load factors on learning. Further research also suggested to focus on the different characteristics embedded in e-book design to lessen the cognitive load and therefore increase the use of e-books in the teaching and learning process.

Publishers and educators have realized the potential of e-book in educational settings. Interactive abilities are to search and highlight text, make notations and to bookmark pages and dictionaries (Hodas et al., 2001; Rao, 2003), including video and interactive elements which will allow e-books to become active and stimulating learning tools. Consequently, individualized material or personalized interactive information content could

improve the role of e-book in the educational process and lead to improved more efficient learning (Dahn, 2001; Dahn & Schwabe, 2002). This integration has yet to be explored, (isolated study can be apply) in order to determine best practices.

Prior research mentioned about potential capabilities of the e-book such as remote access, easy usage within a virtual learning environment and allowing multiple readers anytime anywhere (Appleton, 2004; Long, 2003; Rao, 2003). Hence, these capabilities enable students to demonstrate their self-efficacy (Simon, 2002) when using the e-books for their learning. Literature reviews also indicate that reading preferences and the use of print or electronic resources varied among different disciplines (Liu, 2006; Slater, 2009). They also suggested that it might be beneficial to explore on how self-efficacy may influence students' learning while using e-books. Additionally, the factors influencing students' self-efficacy and also variation among different disciplines while using e-books would also be a vital area to explore.

It is clear that technology such as e-books plays an increasing role in education. However, the use of e-book is still low with the main reason identified as students preferences of using printed books compared to e-book (Anuradha & Usha, 2006; Ismail & Awang Ngah, 2005; Roesnita & Zainab, 2005; Noyes & Garland, 2006). Among the reasons mentioned were users' characteristics which might affect their perceptions and behaviors towards new technology (Szajna, 1996). Therefore, future studies might examine students' perceive value of the e-books and the use of e-books in teaching and learning process based on students' characteristics. This could provide a very rich lens to explore and understand the reasons of why students would or would not value the e-books as a form of learning tool as both perceived value and prior knowledge facilitates the learning process.

## CONCLUSION

The challenges faced by current educators are to bridge the rapid technological world for students to live in and the classroom environment we expect them to learn in. Technology such as e-book can act as a catalyst that transforms the classroom into an interactive learning environment, having the power to make the instructor a better facilitator or coach, and bringing greater resources to bear in the classroom and adjusting the instruction to fit the person (Christen, 2009). However, e-book is still entangled with issues such as an acceptable definitions and functions; limited earlier research with contradictory results; in addition the majority of the research limit in its scope.

The arrival of e-books presents many opportunities for users and the teaching and learning process in a new, convenient and cost-effective way. Undoubtedly, e-book can offer learning materials that fits the need of computer-literate, technology-savvy, and net-generation students. This paper has identified several gaps in current literature and suggested direction for future research on e-books. The gaps shows that there is still a chance to improve the current uses of e-books while the direction will further encourage on-going enhancement on the use of e-books in the teaching and learning process especially as a learning tool.

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