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Exploring the Influence of Utilitarian, Cognitive and Affective Factors on the Use of E-Books via Handheld Mobile Devices: A Review

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ABSTRACT

Electronic books (e-books) can be read via dedicated e-book readers and multipurpose handheld mobile devices such as iPads and iPhones. Certain factors influence the use of academic e-books via these handheld mobile devices. The aim of this paper is to systematically review the factors which influence the use of e-books via handheld mobile devices for academic purposes in higher learning institutions. Two search strategies were used to identify the relevant literature of the studies reviewed. At the first stage, electronic databases and journals such as Emerald, Scopus, ProQuest, SpringLink, Science Direct, Wiley Online Library, Academic Search Premier, Communication and Mass Media Complete and Education Research Complete and ERIC were used to search for the relevant articles. Furthermore, journals pertaining to technology in education were searched individually to identify more relevant papers. The keywords used for the search were acceptance, adoption, use, electronic book, handheld mobile devices, e-reader, iPad, PDA and iPhone. At the second stage, snowballing method was used to identify the relevant articles by extracting them from the bibliography of key articles cited in this paper. An article was used for this review if it met three pre-determined

criteria. The findings show that utilitarian, cognitive and affective factors influence the use of e-books via handheld mobile devices. However, not many articles explore the influence of affective factor on the use of academic e-books via handheld mobile devices. This systematic review is able to identify the main contributing factors that influence the use of e-books via handheld mobile devices. This review may guide e-book designers, publishers, aggregators and authors to develop e-books which are tailored to the consumers' needs.

Keywords: E-book, handheld mobile device, academic, adoption.

1. Introduction

Books are important learning materials for scholars since ancient time. They have played a very crucial role in assisting the scholars to find new information and enhance their knowledge. Nowadays, books are delivered in two typical formats: print and digital. Books with digital format are perceived to be the new medium which strives to capture readers' attention. Print books, on the other hand are perceived to be an established reading format and have been accepted widely by the readers. Although print books deliver many benefits to the readers, some of their limitations such as slow delivery time, high cost, and negative environmental effects have caused the readers to divert to digital or electronic books (Roesnita and Zainab (2013)). Furthermore, the growing number of digital users has created a promising platform for the e-book industry.

When e-books were first introduced to the market, they were seen to have the capability to replace printed books (Catenazzi et al. (1997)). However, the uptake of e-books was not as expected and faced many critics from consumers, authors, and publishers (Chong et al. (2008)). E-books were mainly criticized for their usability issues, cost, copyright restriction and lack of standardization (Kang et al. (2009)). The main issue with e-book is the readability problem. Studies have reported that students took slightly longer time to read e-book via computers and handheld mobile devices when compared to p-book (Connell et al. (2012); Kang et al. (2009)). Many students still argue that reading e-book is not that easy for eyes and causes eye strain when reading continuously for more than 40 minutes (Glackin et al. (2014); Pölönen et al. (2012)). These students believe that reading academic e-book either through computer screen or handheld mobile devices is still not suitable (Pölönen et al. (2012)). In addition to this readability issue, in the academic environment e-books were only

made available in a few subject areas such as classical literature, economics, business, health, education, technology, engineering, and computer science (Lin et al. (2010)). Although other subject areas welcomed e-book technology, the production of e-books in those areas such as graphic design and pure science was not encouraging and hence not many e-books were available in those subject areas.

Despite all these limitations, interest in e-books continued to rise. This interest led to an increase in the number of research works pertaining to e-books and their related technology around the world. Furthermore, around 15 new e-readers were introduced to the market (Herther (2011)). Amazon even claimed that its sales of e-books exceeded the sale of printed books (Miller et al. (2011)). Meanwhile, more alternative devices such as the iPad, iPhone, and free e-reading software programs for reading e-books were made available in the market for the use of the general public (Manley and Holley (2012)).

When the e-books were introduced in the market, it was accessed and read in a static interface of the personal computer environment. However, when the needs and lifestyle of the consumers changed, handheld mobile devices were introduced to access and read e-books in the mobile environment. These days, a consumer uses the e-reader (a dedicated e-book reading device) a smart phone or an iPad which has embedded mobile applications to read the e-book in the mobile environment. Reading through handheld mobile devices is perceived to be a fashionable and necessity in this global economic era. Current generations, particularly scholars like to maximize their time by reading while waiting for or travelling in airplanes, buses, and trains. The introduction of these mobile devices to read e-books is considered appropriate and worthy.

Many e-book publishers and vendors believe that academic institutions provide a suitable market for the e-book industry as they think that books are synonymous with academic institutions. The introduction of handheld mobile devices to read e-books also provides a convenience platform for the academic users to access and read e-books. Many studies relating to e-books have been conducted in academic institutions such as schools and higher learning institutions. These studies reveal that academic users prefer to read e-books of the fiction type through handheld mobile devices as compared to non-fiction e-books (Schomisch et al. (2012)). Therefore, e-book publishers and vendors believe that this scenario can dampen the e-book market and cause academic institutions not to get any added advantage from this technology.

Past literature shows that there has been an array of review papers about e-books. These articles have reviewed different issues about the e-book. For

instance, Sawyer (2002) presented a review article on the e-book to establish its appropriate definition, to discover its benefits and drawbacks. This article also discussed the main users of the e-book, uses and usability of the e-book, the features that the users look for in the upcoming version of the e-book and the factors that inhibit its use. ? published a review paper on the e-book which discussed the pros and cons of the e-book, impact of the e-book on the publishing industry, libraries and librarians, and digital rights management. The review also focused on deriving a new definition of the e-book from the existing literature. Connaway and Wicht (2007) further examined the literature on the e-book which had been published from the year 2000 to 2007. Their article reviewed the e-book service offered in terms of the librarians' perspectives such as their views on the patrons' usage rates, the integration of the e-book in the curriculum model and the barriers in the integration of the e-book into the library model, and the academic community's perspectives.

Slater (2010) reviewed articles about e-books which had been published from January 2000 to December 2009. The review basically discussed how people used e-books, the users' perceptions on e-books, the types of the e-books used, their uses as compared to their print counterparts, the problems encountered while accessing and using e-books, the emergence and use of Kindle e-readers and the problems faced by librarians and patrons in acquiring e-books from libraries. ? conducted literature-based analysis to identify the future research topics regarding e-books. They pointed out the various research methods and techniques that were used in e-book based research. They analyzed articles published between 2010 and 2011 and made suggestions based on 28 relevant articles.

Staiger (2012) reviewed more than 24 articles published between 2006 and 2011. The author reviewed the articles about e-book studies which were conducted at colleges and universities in the Anglophone world to identify the awareness and usage rate of e-books among the respondents, how e-books were used, the main users of e-books and the perceptions regarding the advantages and disadvantages of e-books. Blummer and Kenton (2012) also did a literature review on articles published from 2005 to 2012. Their review focused on academic librarians, their practices for acquiring, cataloging and maintaining e-books at their institutes' libraries. Furthermore, it focused on the promotion initiatives undertaken by these librarians at their institutes.

Walters (2014) reviewed articles published after 2005 about e-books and academic libraries. The review was done to identify the academic landscape of e-books and types of restrictions on the library's e-books. These restrictions which affected the e-book reader and other mobile devices in the lending

program were also examined.

The review articles cited in this paper have revealed important issues relating to e-books from the perspectives of the end-users and librarians. However, not many review articles (except for Slater (2010)) have discussed the latest trends relating to the use of e-books via handheld mobile devices (such as the e-reader, iPad and iPhone). Therefore, this article reviews these empirical articles to identify the factors that influence the use of academic electronic books via handheld mobile devices such as the iPad, iPhone, PDA, and e-reader in higher learning institutions (HLI). For the purpose of this article, the phrase electronic book via handheld mobile device is referred to as mobile book (m-book).

2. Significance of this Review

The current scenario in the e-book industry reveals a positive growth in terms of its production and sales records (Behler and Lush (2010)). The latest improvement on the e-book technology causes the e-books to be accessed via multipurpose devices such as handheld mobile devices. The current educational practices which give emphasizes to mobile learning benefited from such technology. However, statistics reported by many researchers have indicated that the e-book has not receives positive responses from the consumers (Foasberg (2011) ; Roesnita and Zainab (2013)). It is important to assess the consumers' attitudes and perceptions towards e-books especially mobile e-books to create a balanced platform between the production of mobile e-books and their adoption as well as acceptance. Therefore, this review is significant in terms of identifying the factors influencing the consumers' use of mobile e-books to assist the e-book designers, publishers, aggregators, and authors to further develop mobile e-books which tailor to the consumers' needs.

3. Methodology

Two search strategies were used to identify the relevant literature of the studies. This strategy was suggested by Page (2008) and considered as the appropriate and efficient method to identify relevant literatures. At the first stage, relevant electronic databases such as Emerald, Scopus, ProQuest, SpringLink, Science Direct, Wiley Online Library, Academic Search Premier, Communication and Mass Media Complete, Education Research Complete, and ERIC were used to search for the relevant articles. The keywords used were acceptance, adoption, use, electronic book, handheld mobile devices, e-reader, iPad,

PDA, and iPhone. Furthermore, individual journals pertaining to technology in education were searched individually to identify more relevant papers, for example, Journal of Computer Assisted Learning (JCAL), Computer in Human Behaviour, British Journal of Educational Technology (BJET), Journal of Educational Technology and Society, The International Review of Research in Open, Distance Learning (IRRODL), Australian Journal of Educational Technology (AJET), Computers and Education, Contemporary Educational Technology, Turkish Online Journal of Educational Technology (TOJET) and Educational Technology Research and Development (ETR&D). At the second stage, snowballing method was used to identify the relevant articles which were extracted from the bibliography of key articles of this review. The literature search was conducted from August 2014 to December 2014 and limited to only English-language studies published between 2010 and 2014.

An article was considered for this review if it met three criteria: (a) it focused primarily on the use of e-book via handheld mobile devices (the PDA, iPhone, iPad, and e-reader only); (b) examined the factors of adoption or acceptance either exclusively or in addition to the presence of other constructs (e.g., purpose of use, type of reading, challenges, and impacts) and (c) the research was undertaken in the setting of higher learning institution and among students. For the purpose of this article, only peer-reviewed studies published in academic journals were included. Therefore, literature reviews, conceptual papers, conference proceedings, theses and government reports were excluded for this review. Duplicate publications were removed. The articles were screened for relevance, mainly based on the titles, abstracts and keywords.

4. Synthesis of the Search Result

This review found a total of 17 articles on the factors for using academic e-books via handheld mobile devices published between 2010 and 2014 (Table 1). These articles were published in 16 multidisciplinary journals associated with technology, education, librarianship, and business. Six papers were published in 2012 and five articles in 2013. Only one paper was published in 2010 and the quantity was increased to 4 in 2011. During the search period for this review article, only one paper was published in 2014. However, this figure is expected to grow as the area of study is gaining increasing popularity.

As can be seen in the Table 1, most of the reviewed studies were conducted in USA (n=9) and tailored to the popularity of e-books and handheld mobile devices there (Behler and Lush (2010)). Even, the leading e-book publisher and e-reader manufacturer, Amazon, sponsored research related to e-readers

in American universities such as Princeton, Case Western Reserve University and the University of Virginia (Kolowich (2010)) . Such research activity has created more awareness and interest among the academic population to use e-readers in their academic work in USA. Some of the developed countries such as Australia (n= 1), Germany (n=1), and UK (n=2) have conducted research on using e-books via handheld mobile devices. However, the number of research studies which identifies the relevant factors concerning use is still low. In Asian region, only Taiwan (n =3) has conducted research on the use of academic e-books via handheld mobile devices since the government gives some initiatives for conducting research in this area. Although Lee (2013) conducted research on the factors and barriers that determined the use of e-books via handheld mobile devices in South Korea, the research did not focus on the academic environment. Therefore, Lee (2013) recommended more research on the use of e-books via handheld mobile devices in the academic environment to identify the potential uses in the academic world. Hence, it can be concluded that studies that focus on identifying the factors influencing the use of academic e-books via handheld mobile devices according to Asian and European perspectives are still lacking.

This review so far as shown that most of the studies were conducted across different disciplines and focused on evaluating the use of social science m-books. This situation implies that m-books are more popular in the social sciences (Lin et al. (2010)). Some of the science based m-books such as dental, Information Technology and engineering had also been evaluated. However, none of these studies has identified the use factors for pure science m-books such as mathematics, physics, and chemistry which involve more formulae, diagrams, and theories. This lack of research can cause an unstable development in terms of pure science m-books as compared to m-books in other disciplines for continuous improvement.

The majority of the studies reviewed utilized quantitative methods (n =10) to collect data from their respondents. These quantitative studies yielded useful information about the trends in the use factors of e-books via handheld mobile devices. However, more qualitative studies are desirable since the utilization of e-books via handheld mobile devices is still a new niche area of research which requires more in-depth responses from the users. More research can create more user friendly devices. As for qualitative methods, they could explain the inconsistencies found in quantitative methods (McCormack et al. (2010)).

Table 1: Summary of findings.

Author(s)	Country	Courses	Method	Devices Used
Lai and Chang (2010)	Taiwan	-	Quantitative	e-reader
Behler and Lush (2011)	USA	Humanities	Qualitative	e-reader
Geist (2011)	USA	-	Qualitative	iPad
Nie et al. (2011)	UK	Occupational Psychology and Education	Mixed method	e-reader
Weisberg (2011)	USA	Management strategy class	Mixed method	e-reader, iPad
Broadhurst and Watson (2012)	UK	Business	Qualitative	e-reader
Chang et al. (2012)	Taiwan	English	Quantitative	PDA
Martinez-Estrada and Conaway (2012)	Mexico	-	Quantitative	e-reader
Kirk et al. (2012)	USA	Engineering/ science, arts major, business, social science	Quantitative	e-reader, tablet computer, iPad
Lai and Ulhas (2012)	Taiwan	Information management and Technology management	Quantitative	e-reader
Richardson Jr and Mahmood (2012)	USA	Information studies	Mixed method	e-reader and iPad
deNoyelles and Seilhamer (2013)	USA	-	Quantitative	Android, iPhone, iPad, Kindle
Richardson et al. (2013)	Australia	Accounting	Quantitative	iPod
Rockinson-Szapkiw et al. (2013)	USA	Education	Quantitative	Handheld mobile devices
Schomisch et al. (2013)	Germany	Social science	Qualitative	e-reader and iPad
Sloan (2013)	USA	Information System	Quantitative	iPad
Parson (2014)	USA	Dental	Quantitative	Tablet Computers

This review also has highlighted that most of the studies have used dedicated e-book readers (n=10) as compared to multipurpose devices such as the iPad, iPhone, and PDA. However, the increasing popularity of the iPad has attracted 7 studies to evaluate the motivating factors behind the use of the e-books via the iPad. The use of the iPad has created a new milestone in m-book use which is previously dominated by dedicated e-book readers.

4.1 Factors associated with e-book use via handheld mobile devices

The articles which were reviewed in this study revealed attributes that influenced the use of e-books via handheld mobile devices. These attributes were grouped into three factors, namely, utilitarian, cognitive and affective. The distribution of variables into the particular group were performed after the review by referring to the suggestions made by Van der Heijden (2004) for utilitarian, Weisberg (2011) and Davis et al. (1989) for cognitive and Okada (2005) for affective. Table 2 shows the factors associated with the use of m-book use.

Table 2: Factors Associated with the Use of M-Book.

Attribute	Utilitarian			Cognitive			Affective		
	Compatibility	Convenience	Media richness	Cost	Technical	Easy of use	Usefulness	Interactivity	Pleasure
Authors									
Lai and Chang (2010)	X	X	X			X	X		
Behler and Lush (2011)		X		X		X			
Geist (2011)		X							
Nie et al. (2011)		X		X			X		
Weisberg (2011)		X		X	X		X		
Broadhurst and Watson (2012)		X			X	X			X
Chang et al. (2012)		X				X	X		
Martinez-Estrada and Conaway (2012)		X		X	X	X	X		
Kirk et al. (2012)								X	X
Lai and Ulhas (2012)	X	X					X		X
Richardson Jr and Mahmood (2012)		X				X			
deNoyelles and Seilhamer (2013)				X					
Richardson et al. (2013)		X				X	X		X
Rockinson-Szapkiw et al. (2013)		X		X					
Schomisch et al. (2013)					X				
Sloan (2013)		X			X	X	X		X
Parson (2014)		X			X				

4.1.1 Utilitarian factor

The utilitarian factor is related to factors which give emphasis to the functional or instrumental aspect of a technology product (Okada (2005)). Utilitarian factors are perceived to be the necessity aspects of a system and used mainly to perform tasks (Van der Heijden (2004)). In this review attributes such as convenience, compatibility, media richness, cost and technical features are considered as utilitarian factors as they are related to the functional element of the m-book.

This review has found that there is a direct relationship between the utilitarian factors towards the use of m-book. Majority of the studies stated that convenience factors such as the portability of the device and ability to store many books in a device and the flexibility of reading the e-book in anywhere and at any time became the important factors that influence the use of the e-book via handheld mobile devices (Broadhurst and Watson (2012); Chang et al. (2012); Martinez-Estrada and Conaway (2012); Behler and Lush (2010); Geist (2011); Nie et al. (2010), Weisberg (2011); Lai and Chang (2011)). According to the Lai and Chang (2011) and Chang et al. (2012), convenience refers to saving the students time and energy, which encourages them to use m-books. In this aspect, m-books save the students' time by providing faster access (purchasing and retrieving) to the related books, hence enabling them to read particular books even when they are travelling. For instance, Lai and Chang (2011) reported that convenience is the critical factors for the respondents who place greater value towards time and effort to use m-book. In relation to that, the students appreciate the ability to read m-book on the train, in the bed and wherever they go (Weisberg (2011)). Moreover, it is also noted that the ability to search for snippets of information in a fraction of time is the most admirable feature in m-book and save most of students' valuable time.

Lai and Chang (2011) and Lai and Rushikesh Ulhas (2012) reported that the compatibility between the various formats of the e-book and handheld mobile devices was also another determinant of the use of the m-book. If the students are able to use the e-book in various versions and model of handheld mobile devices, it can increase their motivation to use more mobile e-books. Moreover, according to Lai and Chang (2011), the m-book which imitates the look and feel of the physical book also may increase its chance of adoption. Rogers (1995) reported that one of the important factors that determine user's adoption of new technology product is its characteristics or properties. New technology products normally offer new functions or improve the existing functions to meet the market need. In order to increase the speed of adoption it is important for the new product to make compatibility in the sense that it is consistent with

the previous usage habits of the consumers (Rogers (2010)). Therefore, m-book which has similar design and outline of the physical book but with the added advantage of mobile functions increase its chance of adoption (Lai and Chang (2011)).

Media richness attributes which refers to the ability of the handheld mobile device to deliver quality information and content to the consumers also determine the successful use of the e-book via handheld mobile devices (Lai and Chang (2011)). It is believed that media with greater richness can deliver large amount of information with reduced uncertainty and vagueness in communication (Lai and Chang (2011)). According to Daft et al. (1987), feedback, multiple cues, language variety and personal focus are some of the elements that determine media richness of a communication media. In the academic environment, up to date, clear, and precise information about the courses and useful interaction with the digital learning material are important in helping the students' learning process. According to Lai and Chang (2011)m-book that has media richness quality is mostly valued by the students. Dynamic and vivid content with attractive displays assist in diverting the traditional book lovers' attention towards the m-book.

A few studies indicated that the ability to save cost was another important determinant of m-book use (Stockley et al. (2013); Rockinson-Szapkiw et al. (2013); Martinez-Estrada and Conaway (2012); Behler and Lush (2010); Nie et al. (2010); Weisberg (2011)). For instance, Martinez-Estrada and Conaway (2012)noted that online books were 50 to 80 percent cheaper than physical books. This factor is important since textbooks are the main reference materials for the students and any increasing cost of the paper books always denies the students their ability to purchase paper books. In contrast to this, some of the students also argued that m-book is expensive as the e-readers and tablets used to read e-book is expensive. Thus, students from lower income group specially are unable to take advantage to use this m-book. In accordance to this, the author Martinez-Estrada and Conaway (2012)argued the price of using m-book is still considered cheap as compared to paper book.

Technical feasibility of the m-book can influence its use too. Some of these features such as the ability to highlight, annotate and bookmark imitate the activities performed in physical book. These basic features provide a feeling of using the physical book to the users. Hence, its increase their familiarity towards the m-book. These basic features are also perceived to be important for assisting students' deep and critical reading (Jensen and Scharff (2014)). By doing the critical reading, the students able to structure, analyze ideas, derive meaning and communicate understandings about subject content (Conley

(2008)). However, some of the students noted that they were facing difficulties in typing notes in m-book. Alternatively, they only used highlight function to overcome this problem (Li (2008)). The students reported that inability to make notes in m-book disappointed them and reduce their interest in using m-book. Therefore, a well designed basic technical feature of m-book has great opportunity to attract more students. Other more advanced features can also encourage the use of the m-books with the built-in dictionary, full-text search, read aloud materials, sharing of properties, and hyperlinks to external reading resources. For instance, Martinez-Estrada and Conaway (2012) stated that read aloud materials helped the international students from the university campus of Tecnológico de Monterrey, Mexico to learn English faster and score better for the Test of English as a Foreign Language (TOEFL). Many students are also noted that they use m-book because it is easy to search (Schomisch et al. (2012); Weisberg (2011)). Many of them rated the search function as the most important function for them as they read m-book mostly for finding relevant and specific information (Schomisch et al. (2012)).

4.1.2 Cognitive factor

Cognition consists of a series of processes which involves tasks such as retrieving information, storing particular information, and processing it (Tait-McCutcheon (2008)). Cognition factors are factors that are related to the thinking process of human behavior. Cognitive factors are predominant factors for m-book use. This review includes two attributes, namely, usefulness and ease of use as the subsets of the cognitive factor. These factors determine how easy it is to learn to use m-books (ease of use) and what the relevant positive impacts are to the learning process (usefulness). Basically, ease of use, access, navigating, reading, and installing the reader software strongly influences the students' mentality and hence determine m-book use. According to Davis et al. (1989) innovative products that are easier to use and less complex can attract more users and consequently increase the usage possibility. Therefore, m-book which gives less mental load to the users in terms of operationability encourages more students to use it.

Furthermore, the usefulness of m-books in increasing students' engagement in learning and creating positive learning outcomes determines the use of m-books (Martinez-Estrada and Conaway (2012); Weisberg (2011)). These factors are very important for students in gaining knowledge and changing the learning practices. For instance, students who are using m-book is perceived to have better acquisition of skills and have same or better feeling towards learning (Rockinson-Szapkiw et al. (2013)). This helps the student to form positive attitudes towards the use of m-book. Besides that, it is also evident

that engagement level and retention level of students who are using m-book is as equal as students who are reading paper bound textbook (?). Similarly, Richardson Jr and Mahmood (2012) reported that students like to use m-book because it enhances the efficiency, satisfaction and students' independent learning skills. Hence, it can be concluded that, if m-book is able to assist the students in enriching their knowledge on their subject contents and produce more positive learning practices then the students will show more interest in using m-book.

4.1.3 Affective factor

?defines affect as the "feeling of joy, elation or pleasure, depression, disgust, displeasure, or hate associated by an individual with a particular act". In this review, the affective factor refers the feeling of pleasure, arousal or dominant impact when interacting with the mobile e-book. Not many studies have highlighted the influence of affective factors in determining m-book use. According to Straub (2009) affective factors are gaining popularity in determining the adoption of technology products. Kulviwat et al. (2007) contend that affective factors are important if users are given the choice to either to adopt or reject a system. In this review, the attribute, pleasure, can encourage m-book use due to the learning environment, with attractive colors and backgrounds (Lai and Chang (2011)). In accordance to that, Broadhurst and Watson (2012) even mentioned that a pleasant reading environment such as an attractive user interface which was aesthetically pleasing to the eyes could play a major role in m-book use. Furthermore, enjoyable features such as background music, visualization aspects, audios and two-way interactions between m-books and students, can increase the use of m-books (Lai and Chang (2011)). Finally, the ability of the m-books in satisfying the real needs of the students by fulfilling their expectations can also determine m-book use.

5. Limitations

This review article has several limitations. Although this article has reviewed most of the studies which are related to the objective of this study, publication bias is likely to exist. Although the authors have searched many databases and used the predetermined keywords, they may have missed other relevant articles by neglecting some keywords pertaining to the focus area of this research. Furthermore, only articles written in English were reviewed. Hence, this review may have limited the inclusion of other significant articles which are written in languages other than English.

6. Conclusion

This review has explored the factors that determine the use of academic e-books via handheld mobile devices among the higher learning institution students. It has revealed that most of the studies were mainly conducted in USA and the factors were not extensively studied in other parts of the world especially in Asian and European region. Therefore, it is essential to conduct this kind of research in the other regions where the m-book has potential to expand. Furthermore, not many studies have evaluated the use of e-books via handheld mobile devices in pure science courses such as mathematics, chemistry, and physics. Detailed research may help in revealing important factors that can motivate or hinder the use of e-books via handheld mobile devices in these pure science subjects. Such research may also pave the way to further improvement and development of m-books in these subjects and divert the students' attention towards m-book. Finally, not many studies have explored the importance of affective factors in the use of m-books. Since the current generations are moving towards the "learning through fun and pleasure" concepts, it is important that affective elements are integrated into m-books and subsequently evaluated.

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