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How Interface Elements for Page Turning in eBooks Affect Reader Preference

A thesis

submitted in fulfilment

of the requirements for the degree

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Abstract

Whether we are young or old, all of us have read many kinds of books and articles from an early age. Reading has influenced us at different stages of our lives, and with the development of modern technology, various kinds of electronic devices such as iPads, mobile phones, and kindles, have gradually taken part in our daily lives and now play an indispensable role.

Recently, physical books have been replaced by a new style of literature – eBooks. What is an eBook? What elements affect judgment and attitude of readers to eBooks? How do different styles of interface design for page turning impact readers? These are the main issues needing to be illustrated and researched in this thesis.

Elements of interface design such as page turning, content presentation, letterform, typography, illustration, picture, and audio, are all features of eBooks that may impact the reading experience. These elements affect different readers and guide them when they read. The purpose of this research was to investigate how the interface elements for page turning influences the preferences of readers with different backgrounds. A case study investigation of current page turning norms was also undertaken. The case study identified the common interactive elements of page-turning methods typically used in eBooks.

This thesis demonstrates that readers with different backgrounds had preferences for different interactive page turning methods. These preferences were impacted by age, gender, occupation and qualification differences amongst the readers who participated. The conclusion is that readers with different backgrounds will prefer different types of interactive elements for page turning.

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Chapter One – Introduction

The purpose of this thesis was to find out the effect of different approaches of page turning on readers and the possible factors that affected preferences of participants. The result of this research not only related to the investigated approaches of page turning, but also related to the age, gender, occupation and qualification of participants.

1.1 Motivation

eBook usage continues to grow. According to the website www.statista.com:

Technology and mobility have influenced every step of consumer's life, including the way they read books. Book readers have started to change their reading habits, opting for different types of formats of books, such as e-books. An e-book, also known as an electronic or digital book, is a digitally released version of a book, often consisting of text and images and available on electronic devices, such as specifically designed e-book readers. This shift in media consumption habits has a direct impact in the book industry. The e-book industry is here to stay, showing healthy projections. By 2018, e-book sales are forecast to account for about a quarter of global book sales. Consumer e-books alone are projected to generate nearly 20 billion U.S. dollars in revenue by 2018 (Statista, 2016, paragraph 1).

This highlights the timely need for continued investigation into the use, development and design of eBooks for a range of users.

To research and investigate the features that affect the preference of readers is an interesting challenge, and a range of factors including the age, gender, occupation and qualification of participants is likely to influence the results of this research.

This research will produce insight for designing a successful eBook or eReading interface. The findings of this thesis will be useful for devising more acceptable approaches of page turning for readers.

1.2 Research hypothesis & questions

In this section the researcher outlines the hypothesis and research questions around which this thesis will be structured.

The hypothesis of this research is:

The interactive elements of various approaches to page tuning will affect readers' preferences and experiences during reading.

There were three main research questions required to investigate this hypothesis. These related to the preference of participants, the common features of devised approaches compared with existing page turning approaches, and how different groups of participants perceived the various approaches.

The three questions that are required to investigate the hypothesis of this thesis are:

RQ1: What are the current norms for page turning in digital books?

RQ2: What interactive features of page turning could affect readers' preference?

RQ3: Is reader preference affected by reader background?

1.2.1 What are the current norms for page turning in digital books? (RQ1)

This question is required to develop the parameters for this research. To understand what elements of page turning in digital books influence readers' preferences and experiences. The researcher will firstly investigate how current eBooks or eReaders treat page turning. This research question is addressed in the literature review described in Chapter 2 and case study outlined in Chapter 3. In the literature review the thesis reports the existing interactive elements of page turning in eBooks. Chapter 2 and Chapter 3 demonstrate that current norms for page turning in digital books depend on the different interactive elements and approaches of page turning (see Section 2.2.4 and Section 2.3.2). The current interactive elements for page turning were illustrated in Chapter 3 (see Section 3.1.3 and Section 3.3.3) they included Icons, Arrows, Swipe gestures, Tap/Touch gestures, Slider

tools and Page Miniviews¹.

1.2.2 What interactive features of page turning could affect readers' preference? (RQ2)

Research Question 2 is required to investigate and propose elements of page turning that require investigation in this thesis. In Chapter 4 (see Section 4.3) the researcher developed design ideas for page turning that can be tested by the research performed for this thesis. The speed of page turning, the animation of page turning, the gap between interactive points and size of Icons could affect the preference of readers. Chapter 4 illustrates that the way of touching the screen also could be an important element that affects readers' preference. Clicking or tapping the screen to turn the page was different from swiping the screen to turn the page; these two different ways of touching the screen could give readers different reading experiences and guide their preference. Thus, different approach of page turning and interactive elements could affect readers' preference.

1.2.3 Is reader preference affected by reader background? (RQ3)

The answers to this research question are outlined in Chapter 4 through a series of investigations. The result of the investigation in Chapter 4 demonstrated that the preference of readers not only depended on the interactive elements of page turning in eBooks, but also related to the different age, gender, occupation and qualification of participants. In Chapter 4, the results demonstrated that the younger participants (18 to 25 years old) preferred a method that allowed for a fast speed of page turning. Older participants (over 45 years old) liked the Swipe approach, which seemed like a real book. Participants who had qualifications above a bachelor degree preferred a more intuitive approach while students preferred an approach that allowed for finding information quickly. This chapter addresses the research question RQ3 that readers' preference was definitely affected by reader background.

¹ The Page Miniview feature is described in Section 3.3.3

1.3 Structure of this thesis

Here the researcher outlines the structure of this thesis with particular reference to the research questions.

Chapter 2: This chapter provides the background for this thesis including an overview of the existing interactive elements for page turning in eBooks and literature pertaining to the research hypothesis. This section reports the findings of previous studies of eBooks that detailed and demonstrated the developments of eBooks, some of the preferences of readers and research pertaining to interactive elements of eBooks. This section begins addressing RQ1; what are the current norms for page turning in digital books?

Chapter 3: This chapter describes a case study that investigates the features of existing approaches of page tuning in applications in the iOS system, the Android system and the Kindle system. This section analyses the different features of page turning approaches and provides useful information for further research. This chapter further demonstrates the first research question RQ1.

Chapter 4: In this chapter, the researcher devised six different page-turning approaches based on the findings from the case study. An observation study investigation for researching readers' preference for different page turning methods was carried out. This chapter demonstrates the factors that affect preference of readers and analysed the reason for the investigation result. This chapter addresses the research questions RQ2 and RQ3; what interactive features of page turning could affect readers' preference; is readers' preference affected by reader background?

Chapter 5: Finally, this chapter summarizes and concludes the contribution of this thesis, and provides guidance and suggestion for further research of page turning in eBooks. This chapter illustrates the results of the observation investigations, highlights the findings of the case study and summarizes the main ideas of the literature review.

Chapter Two - Literature Review

This chapter addresses the previous research relating to interactive elements (such as covers, typography, illustration, page turning and interactive points) of page turning in eBooks, which includes the development of eBooks (see Section 2.1), interface design (including page turning, see Section 2.2), and related work on user preference studies (see Section 2.3). This chapter begins to address Research Question 1: *What are the current norms for page turning in digital books?* and RQ2: *What interactive features of page turning could affect readers' preference?*

2.1 The evolution of eBooks and their influence

According to Bidarra, Figueiredo and Natálio (2015), the development of the digital book format, there have emerged numerous kinds of platforms, which can exhibit articles, pictures and motion graphics in electronic format to readers. PDF is one of the most common eBook formats used today and it can be read by most computers including mobile devices such as the Amazon Kindle, the Barnes & Noble Nook, Apple's iPads, Android devices, amongst others (Bidarra, Figueiredo & Natálio, 2015).

Digital books utilize their unique searchability and reading format to gain popularity among present society, and they also have different search ability and screen features to readers. Richardson and Mahmood stated that in modern society, eBooks have become popular amongst a range of different age groups. eBooks may be more convenient for users for a number of reasons including the number of books that can be carried on a single device, convenient interaction elements and the ability to hold additional forms of information such as audio and video (Richardson & Mahmood, 2012).

2.1.1 Advantages of eBooks

Books have been converted from printed format into technological devices. With the developments of technology, digital books may have become more useful than the

printed book, because these digital books just need to be stored in a device and they just occupy a little space of bags. Readers can read digital books everywhere and anytime they want (Liesaputra & Witten, 2012).

Studies of eBook utilization discuss the popularity and acceptability among readers of eBooks today. Rojeski (2012), an expert in the design of eBooks, stated that the popularity of eBooks depends on the environment where reading is carried out and different groups of readers. He also listed a number of advantages of online eBooks for readers including easy download and cheap price, that is why readers prefer online eBooks (Rojieski, 2012).

eBooks have many practical advantages for eReaders, one being conveying information promptly. Marshall and Bly (2005) mentioned that readers could buy, download and begin understanding eBooks within a few minutes, without leaving their seat. They do not need to go to a bookshop to purchase them, or wait for them for a long time; they can just download it to their device.

eBooks present numerous advantages, for example, readers can easily download and buy eBooks through the Internet. After installing an eBook reading application readers will either be navigated to a download page or get the download in an email. Readers only need to simply click on the connection and the digital book will naturally download to readers' personal computers, or to readers' own platform (Marshall & Bly, 2005). For most people, it is easy and simple to buy and download an eBook. People can simply get an eBook whether they are living in inner city or in a remote town. Marshall and Bly (2005) considered that one could discover various kinds of eBooks, fiction and non-fiction, free and not free.

eBooks are environmentally friendly to publish due to the fact that no trees are required to be utilized for eBooks. When you need certain information, you can get it quickly, by downloading a digital book (Marshall, 2010). Moreover, Marshall (2010) also stated that there is no doubt that eBooks consume less physical space. Readers do not need any space to store them. A large number of eBooks can be stored on their personal computer

or reading gadget, and eBooks are compact. Readers can carry an entire library of many books with them, on CD, in a laptop, note pad or any digital book readers, without stressing over their weight.

While eBooks can be read in Kindle or iPad as well as on PC screens, these small gadgets have issues. A survey on reading platform was carried out with readers to find out which part of digital screens for reading cannot respond to the touch of fingers. Regardless of these issues, most academic research utilizes eBooks in more than one form (Liesaputra & Witten, 2012). Liesaputra and Witten considered that if books are adequately replaced by digital books and have independent structure, there would need to be more than one form of page turning supporting the need for this research.

2.1.2 The popularity of electronic reading

Electronic writings have been with us for a long time and in recent years electronic reading has turned out to be progressively pervasive. Marshall (2010) stated that the portable devices like smart phones and tablets, alongside committed devices like the Kindle and Nook, have moved digital reading out from behind a work area. Marshall said this change has emphasized the contrasts between reading in print and reading by means of computerized gadgets.

With the development of new media, print books have been replaced gradually by eBooks; Martin and Aitken (2011) stated in particular that which are operated by Kindle, Sony and the iBook's reader. eBooks can even include video, animations, kinetic typography, hyperlinks, geo-location, social interaction and audible effects with the flip of a finger, which can convert into a computer game rather than being a linear narrative (Martin & Aitken, 2011).

This evidence of increased popularity of eReading supports the need for this investigation.

2.2 Interface design

This section illustrates different styles of interactive elements for designing an eBook, in particular including considerations for page turning, content presentation and structure, typography, illustration, audio, and motion graphics. These features are significant and vital to the design of a successful eBook.

2.2.1 Content, typography, and illustration of eBooks

Bidarra, Figueiredo and Natálio (2015) stated that visual interface elements could influence readers' preference and their attitude to eBooks; sometimes it seems that content of an eBook is irrelevant to the assessment of readers. Some visual elements such as interactive points and motion graphics can directly decide the popularity of an eBook.

Marshall and Bly (2005) said that it could be stated that visual elements play a key role for navigating readers. For example, the different page-turning methods could give readers different reading experience. The interactive points and typography also affected the assessment of readers of an eBook.

Researchers have noticed that illustration attracted young students a lot, which also impacts on students' reading comprehension. Traditional education has been based around printed textbook use, but searching information with eBooks and mobile devices become an increasingly attractive option day by day. This may be due to the fact there are more attractive illustrations, moving graphics, and interactive elements in eBooks that can trigger students' interests. The development of multimedia tools and methodologies, which improve outcomes for student learning remains a challenging question for authors and institutions (Bidarra, Figueiredo, & Natálio, 2015).

Sargeant et al. (2015) said that each title utilizes key words to demonstrate its content and significance, which can explain its concepts and relevance. There are several main elements including content, typography and illustration, which dramatically influence the popularity and value of a digital book. Readers are always impacted by these

interactive elements, not only content (Sargeant, 2015).

Typography to a large extent can influence people whether they could fall in love with an eBook instantly, because different types of typography can exhibit different effect on readers. People in different age groups are keen on different types of typography (White, 2012). Illustration is the most attractive element in eBook design, White (2012) considered that because pictures can directly express what the meaning of content is, and readers can understand the meaning of a digital article via pictures and illustrations. Illustration can also influence whether readers like an eBook on first sight. All in all, content, typography and illustration are the three most significant elements for designing an eBook (White, 2012).

The utilization of typography and visual features can be helpful for eBooks (Marshall & Bly, 2005). Marshall and Bly (2005) stated that typography to a large extent decides whether the whole structure of an eBook is comprehensive and appropriate in visual feature. Different type of typography can generate different effects for navigating readers; for instance, the size of font and the sequence of relevant content both can impact the preference of readers. Illustration, which includes pictures and graphics, is a main component that can attract readers' eyes.

2.2.2 Interactive features of eBooks

The results of studies about usability are tremendously impacted by interface design, which have confirmed that users' expectations from eBooks are inherited from their experience with paper books. The reason is paper books increase users' subjective satisfaction (Chong, Lim, & Ling, 2009). Some parts of eBooks simulate physical books, such as content, typography and page turning. Some designers tend to research new ways of page turning, such as rolling up and down, page turn right or left; these ways are quite similar to page turning in physical books.

Browne and Coe et al. (2012) stated that eBook browsing is more difficult than in print

books, due to the fact that readers rely on keywords rather than in-depth reading. Most readers just visually scan the title or headings, and derive the meaning from this.

Guthrie and Wigfield (2010, cited in Colombo & Landoni, 2014) pointed out that reading motivation is the inner force that activates the reading of material, which is outside normal interests or attitude. eBooks also display interactive gaming, videos, and animation for increasing reading experience (Colombo & Landoni, 2014), but these features are only on capable devices, such as mobile phone or computer, but not Kindle.

Marshall and Bly considered that there are lots of interactive elements in eBooks that can impact on readers' ability to navigate and orientate in a book, such as page turning, typography and the position of headings. Typography to a large extent can influence the entire layout of a digital article, and also can attract the eyes of readers. A human's brain is easily attracted by visual effect. Thus, the position of pictures, the size of the font, the number of words and more, could be important elements for an eBook (Marshall & Bly, 2005).

The cover of eBooks is important because readers may judge an eBook (or physical book) by its cover. Marshall and Bly (2005) stated that a cover should illustrate what an eBook talks about and what kind of eBook this is. Only in this way readers could ultimately decide whether they read it or not, unless there are other ways they know.

In the Touch Mark application, bookmarks are pictured as thumbnails on a vertical bar that is shown next to the scrollbar (Logan, 1983). The positions for the bookmarks on this vertical bar are consistently divided so that there is level arrangement between the scrollbar and the bookmark thumbnail connected with the relevant pages. Wightman, Ginn and Vertegaal (2010) stated this idea. In eBooks, readers can swipe the screen to turn the page, drag the dot to jump to the next page, click the screen or turn the page. Miniviews to change content. These different interactive elements constitute the main visual features in eBooks.

2.2.3 Page turning in eBooks

Page turning is an important interactive feature for an eBook, due to the fact that digital content exhibited on screen, is not the same as printed books. When readers scan a printed book, they can use their hand to hold it and change the page, and there is only one way to do this, but in eBooks, there are many ways of turning pages and searching for the information readers want (Marshall & Bly, 2005).

Readers can navigate pages via different buttons, such as shifting pages by a point on the right side, or click a point to change pages (Marshall, 2010). Also, the researcher of this thesis considers that there are other ways to change pages, for example some high technology devices could distinguish the human voice and verbal command so they could change page automatically and obey human voice orders.

All in all, interactive elements are vital for readers to navigate eBook readers (Marshall & Bly, 2005).

2.2.4 Interface elements for navigating eBooks

People might limit their ideas by their professional skills when they try to create interactive elements in eBooks, such as shape, sound, animation and interactivity (Bidarra, Figueiredo & Natálio, 2015).

Reiter (2011) asked that by what means would authors be able to help readers find what they are searching for on a website? In what manner would authors be able to encourage readers' need to know what to click next or where to search when in quest for something? Interface navigation, interface outline guidelines for the readers, are content based and visual components that help web guests see easily what they have to click or where they can hope to discover what they are searching for (Reiter, 2011) .

Navigation is both the framework that a guest can use to move around a site (related connections, pagination (past/next page), footer route and the visual indication of such as

frameworks (hyperlinked content, tabs, catches). Marshall (2010) said that navigation has two primary functions: to tell the readers where they are, and to empower the readers to go someplace else. In the instance of content-based hyperlinks, it may likewise advise the readers of where they have been. Depending on the interface utilized, links that have been taken might be an alternate visual treatment than an unvisited link (Marshall, 2010).

Marshall and Bly (2005) stated that on the eBook framework, unvisited connections are red, and visited connections are grey. If the reader is acquainted with the idea of unvisited and click connection states, they may re-examine their scanning behaviour.

Marshall and Bly (2005) mentioned that interface elements also include in-page navigation in eBooks. When readers want to find a specific chapter from any page, this in-page search seems to be more important, and readers should input keywords or a line number to find out which part they want to read. Moreover, when there appears a professional term without explanation, there should be an underline which links to a website, so readers could click this link and find out the explanation on a website, such as Wikipedia. However there should be a function that when readers read articles without Internet access, those professional terms should also be explained on a page. Thus, the editor should consider this point and store a specific page with term explanation which could be found without Internet access (Marshall & Bly, 2005).

'Paratext', which is a term used by Cull (2011) means that eBook browser is more difficult than printed books, due to the fact that readers rely on keywords rather than in-depth reading (Browne & Coe, 2012). Readers have some approaches to navigating eBooks via the table of contents, following hyperlinks, searching for keywords or selecting from a list of search results, and using the index to perceive book's structure and language (Browne & Coe, 2012).

In the book *"Reading and Writing the Electronic Book"*, Marshall and Bly (2005), stated that page turning is an essential procedure of reading. It is a pervasive undertaking that numerous individuals take for granted. Additional initiation choices incorporate an eye

switch, button switch, or voice enactment unit. They said that for digital books, there are various kinds of approaches for page turning - readers can alter a digital page manually and readers also can deliver an order automatically. These ideas support the hypothesis of this thesis.

Marshall and Bly (2005) considered that authors and designers could embed what they termed “virtual points” into digital screens, a specific function for turning the page; these points could be compared with real buttons installed on keyboard of electronic devices. The virtual points in digital screens could be touched by fingers, just like real buttons, but there are some differences. The virtual points could be hidden, they appear in front of eyes only when readers need them to change pages, when you click the screen, they would appear, which real buttons cannot do.

2.2.5 Effects of page turning

Browne and Coe (2012) stated that there is an experiment for investigating preferences of students on interface design of eBooks, which was based on page navigation, typography and context.

An experiment by Marshall and Bly (2005) has discovered the impact of different approaches of page turning on participants. In this investigation, each participant described the way they read and thought during the pre-interview; the videotape gave participants an example of reading the magazine that they normally would; and during the post-interview, participants talked about a new issue in the magazine they met. In this experiment, readers chose different reading approaches. 21% of participants read eBook by paging through the book, 49% of participants preferred to tap the middle of a section within the content, and the rest of participants preferred to navigate directly to a section heading (Marshall & Bly, 2005).

McKay et al. (2012) said that based on the page visited navigation, they were able to make assumptions of how users navigated eBooks in an academic setting. Readers in their

study used the table of contents as a navigation more frequently than they used a page number in the upper navigation bar entered: 63 of 200 readers in their study apparently used the left navigation, while only 14 of 200 entered a certain page number in the section navigation.

In the TouchMark (a kind of software for reading eBooks), the bookmarks are required to cross the whole book. The large quantity of bookmarks enhances the searching time, because the system needs to distinguish which page is required to be searched from all these bookmarks. Wightman, Ginn, and Vertegaal (2010) said that their work investigates how these interface thoughts can be connected with the digital book user. They outlined a unique method to help readers avoid skipping through numerous bookmarks when contrasting between removed pages (Wightman, Ginn, & Vertegaal, 2010).

The information of either tab is pressed while exploring a record, when it is discharged, TouchMark (a kind of software) explores the report back to the page that was noticeable when this information was initially pressed, and this page does not need to be bookmarked. Kim and Lee (2013) said that page flipping does not make a bookmark. They utilize a bezel motion to start the page-flipping mode, and this bezel motion started from outside of the screen. This movement only acts a poor reaction on the internal limit of the screen, because the bezel motion is outside the internal screen. Utilizing the bezel motion has a few advantages. Kim and Lee pointed out that in the first place, bezel motion blocks the substance space. What is more, bezel motion is likewise effortlessly accessible from different positions when readers hold the tablet, permitting readers to enter the flipping mode promptly when they have to (Kim, & Lee, 2013).

2.3 Preference of different age groups

This section demonstrates the preference of different age groups and some previous experiments for investigating the effect of different interface elements on readers, which also play a vital role in designing a successful eBook. Different age groups choose different type of eBooks to read, and they also like different approaches of page turning

and interface elements.

2.3.1 Related experimental studies

It is possible to analyse how users explore the information inside of eBooks, and give some understanding into what reading features look like in a digital book setting (Marshall & Bly, 2005).

According to Carlock, Maughan and Anali et al. (2008), the researcher can learn some useful approaches of investigation of participants and utilize them in the researcher's investigation. In the example from Carlock, Maughan and Anali et al. (2008), the objective of the focus group was to learn about experiences and perceptions of the faculty with electronic resources available through the digital Libraries. A list of questions was presented by a moderator, which was used as the basis for the discussion of a focus group and follow-up questions were asked by the moderator. Carlock, Maughan and Anali developed their research questions to elicit feedback on various topics related to eBooks. The questions about eBooks is about half of the focus groups' total time and included how familiar the participants were with eBooks, the way they know the eBook, their attitude to eBook, the reason they use eBooks, the frequency they read eBooks, how they think about the difference and connection between eBooks and printed books, how they choose eBooks, what kind of information they would like to get from eBooks before they choose an eBook (Carlock & Maughan Perry, 2008). The researcher considered that different people had different purposes to use eBooks. Some readers use eBooks for academic information search and some of them just read eBooks for pleasure. Most people found eBooks via Google or general website, and they had a trend to choose an eBook with low price, fast downloaded speed and attractive cover. Readers considered that the printed book is traditional reading method, but digital book will become more popular in the future with the development of modern technology.

Richardson and Mahmood (2012) said in order to know different age of groups' preference for digital books, eBook designers should launch on these following steps:

To identify, describe, and analyse the advantages and disadvantages of eBook readers; to compare and contrast the most popular (i.e. best-selling) devices against a comprehensive, if not exhaustive, set of technical specifications as well as the qualitative judgments of users; to test these two theses: some people will prefer one reader's feature set over the other available devices, and users will want a variety of download sources (Richardson & Mahmood, 2012, 178).

People know how to personalize their e-reading experience through type, size, touching light and language. Children like to read what they really like to read rather than "have-to" (Brynko, 2013). Moreover, many different age groups should read appropriate book materials, and which are not too boring or too complex, an example being school books (Colombo & Landoni, 2014). Many of the comments in question visual display, fonts and graphics include improving the touch screen navigation to make browsing easier, enlarge the size of the screen, more graphic content, auto-scroll for reading, more font size options and high quality graphics (Rowlands & Jamali, 2010).

There is a previous experiment that illustrates the preference of most readers when they choose eBooks to read. Foote and Serrano (2010) pointed out: there were 40 participants involved in this experiment, 61.4% of participants gave positive attitude and experience to eBooks, especially business and management students; they liked eBooks better than print books (Foote & Serrano, 2010). Marshall and Bly (2005) described readers' reaction might be affected by different reading environments.

2.3.2 eBooks interaction among different age groups

The researcher of this thesis considered that different age groups might have totally different standards in judging the value of a book. Differently aged people could be keen

on different types of books; this range is very large and complicated. While experiments can easily observe such interactions, it does not mean that such interactions accurately represent the perception of readers and their attitudes toward a book.

Public libraries report that fiction category is most popular in every age group. For eBooks, biography/memoir, and history are very popular; fiction is average. However, according to existing research, a large proportion of readers think that history and documentary books are dull and boring. Readers are searching for best selling fiction in eBook formats, due to the difficulty of getting these books in libraries (Leverkus & Acedo, 2013).

The researcher of this thesis considered that the young age group had a trend to read more eBooks. Teenagers who read eBooks tend to read these more than they read print books. The researcher also suggested that teenagers who read materials via eBooks not only cultivate their interests on advanced devices such as the computer and iPad, but also suggest that eBooks can enhance their study quality. Due to the fact that eBooks include various kinds of interactive elements that can attract teens, such as various ways of page turning, which accelerate the speed of searching information. eBooks directly save time for teens, they can easily read and find whatever they like via digital books and take them anywhere.

2.4 Conclusion

This chapter described the development of eBooks, eBook page turning, interactive elements in eBooks, and how these elements affect preference of readers when choosing a kind of digital article to read. A lot of information relevant to this topic was collected, especially two extremely useful books: *“Reading and Writing the Electronic Book ”* and *“Designing Usable Electronic Text.”*

Authors and experts of eBook studies predict that eBooks will be more and more popular than physical books in the future, and that one day digital reading material will exceed

the importance of physical ones (Celeste & Cristobal, 2015). eBooks are becoming more and more popular worldwide, and they are widely utilized in many fields. eBooks may be more convenient and useful than physical books because of the different interactive elements in eBooks which can give eReaders a totally different reading experience compared with printed materials (Marshall, 2010).

In this chapter the researcher shared similar ideas to authors such as Marshall and Bly. Page turning is the most important interface element for designing a successful eBook. This is due to the fact that page turning in eBook is different from printed book, and this can significantly affect the preferences and experiences of readers (Marshall & Bly, 2005). There are many approaches to page turning, which are totally different from printed books. When reading a printed book, there is just one way to turn the page - manually.

This chapter illustrated various characters of eBooks, which includes its covers, keywords, content, typography and illustration; as well as different ways of page turning, position of the interactive point and the efficient platform of eBooks. These elements are main features for an eBook, the most significant one is the different approaches of page turning, which impact readers most when they read eBooks and change content. Interactive points are significant for page turning; different position of these points can engender different effect when readers turn the page. Content, illustration and typography is core for an eBook, they are similar to physical book but can be shown in various format. In modern society, eBooks develop with technological devices such as iPad, laptop and Kindle, and more people accept them today, reading eBooks is a trend in the future.

A well-designed eBook includes convenient page turning methods, suitable interactive elements such as interactive points, illustration and typography; these elements grab readers' mind and preference. The style of page turning is the most important point to design an eBook. In order to balance the connection between these elements, and coordinate all features more comprehensively, it is necessary for designers to know the advantages of page turning in eBooks.

2.4.1 Answering RQ1

This chapter begins to answer RQ1: *What are the current norms for page turning in digital books?*

To seek the existing interactive elements in current eBook design, and find the common features in current page-turning methods. The current norms for page turning in digital books most commonly discussed in the literature were interactive points and the different ways of touching the screen to turn the page, such as tapping the screen, dragging an interactive Icon and swiping the screen to turn pages (see Section 2.2.2 to Section 2.2.4). The literature does not offer in depth discussion of the visual design of interactive features for page turning. For this reason a visual analysis of eBook page turning will be valuable.

2.4.2 Answering RQ2

This chapter begins to answer RQ2: *What interactive features of page turning could affect readers' preference?*

In Chapter 2, the researcher demonstrated the interactive features for page turning based on existing studies of previous authors. The Chapter 2 discussed the interactive elements in eBook page turning could affect readers' preference. Readers' preference could be affected by different ways of touch the screen to turn the page and different interactive points. For instance, swiping the screen to turn the page or dragging the slider to turn the page could give readers different experience.

Chapter Three - Case Study

The main purpose of this chapter is to research different page turning methods and interactive elements in different eBook applications in Android, iOS and Kindle systems. The researcher performed a case study of current page-turning methods in eReaders and eReading applications. Several representative mobile applications have been chosen to be the objects of study in this research. An Android tablet that included six applications, an iPad tablet with ten applications and a Kindle tablet were all tested. This chapter contrasts and investigates these applications and their interactive elements for page turning. The Chapter 3 begins to answer RQ1: *What are the current norms for page turning in digital books?*

3.1 Methodology

There were three popular mobile systems available to the researcher for eReading at the time of this study. These were the Android, iOS, and Kindle systems. These three devices were selected in order to compare how the function of page turning and interactive elements work for the same applications in different systems.

A variety of different eBook applications were tested in the three environments.

For the Android device a Samsung Galaxy Note 8.0 tablet was used. On this Android tablet the following apps were tested: Kindle, Blio, Bluefire, Kobo, Book Reader, Txtr eBooks. For the iOS device an iPad tablet was used. On this iOS iPad tablet the following apps were tested: Kindle, Blio, Bluefire, kobo, iBooks, eBrary, Marvin, Megareader. For the Kindle device a Kindle tablet was used. Kindle, different from the other mobile tablet environments does not allow for multiple eReader software.

To select the appropriate apps to test on each device the keyword “popular eBook apps” were searched using the Google search engine. Ten applications were selected to be study objects in this chapter, these applications were popular and common among e-Readers,

and they were also easy to find and download onto the devices. Blio, Bluefire, Kobo, and Kindle could be downloaded in Samsung Galaxy Note 8.0 and iPad Air 2 tablet, they both had Blio, Bluefire, Kobo and Kindle. In iPad Air 2 tablet, excepting the common applications in Samsung Galaxy Note 8.0, there were extra applications, including eBrary, iBook, Marvin and MegeReadLite. Kindle was a professional reading device for eBook, so it did not have any applications. This Kindle KPW2 tablet was an independent hardware, which could download e-articles.

The researcher used finger to indicate gesture when taking photographs. The researcher put the finger on different interactive elements on the screen for three devices, and then taking a photograph for recording their functions.

3.2 The selection of features to analyse

The researcher analysed the available eBook systems and identified the page turning and interactive elements that required recording. Features, such as Icon, Arrow, animation, Swipe, Tap/Touch, Slider, Page Miniview and the function of enlarging the size of font, were considered suitable for this research because they were common and could be understood by most readers. The Table 1, 2 and 3 in this research could clearly illustrate how page turning and interactive elements were utilized in these applications.

3.2.1 Photographic documentation

To record photographs of each reading application there were several points that required attention, such as the approach to page turning (include Swipe, Tap/Touch), Icon, Arrow, Slider, page Miniview, animation, and the function of changing the size of font. These interactive elements were be photographed and documented. The researcher's finger was used to indicate the action being performed in some instances.

3.2.2 Analysis

Tables were made for these interactive elements and are included in Section 3.3. These

Tables illustrate the different approaches of page turning in applications. We identified eight features that required analysis in each App on each device. In these Tables a tick indicates a feature was present in a particular App, while a cross indicates that a feature is not present.

3.3 Results

First photographs of the functions and icons used within the applications were recorded. The typical features of these applications, including whether or not they were clear for readers and gave readers a clue when they could use them to read eBooks, was assessed. There was a common feature in all eBook applications, which was that readers could Swipe the screen from one side to another side to turn the page. In Kindle KPW2 Tablet, it also could Swipe the screen to turn the page.

3.3.1 Applications in three devices

Below is the Table for showing features of different applications in three devices.

Table 1 Android system page turning features

App	Icon	Arrow	Animation	Swipe	Tap/Touch	Slider	Page Miniview	Enlarge Screen
Kindle	×	×	×	✓	✓	✓	✓	✓
Blio	✓	✓	✓	✓	✓	✓	×	✓
Bluefire	✓	✓	×	✓	×	✓	×	✓
Kobo	✓	✓	×	✓	✓	✓	✓	✓
Book Reader	✓	✓	×	✓	✓	×	×	✓
Txtr eBooks	×	×	×	✓	✓	×	×	✓

Table 2 iOS system page-turning features

App	Icon	Arrow	Animation	Swipe	Tap/Touch	Slider	Page Miniview	Enlarge Screen
Kindle	×	×	×	✓	✓	✓	×	✓
Blio	×	×	✓	✓	✓	×	×	✓
Bluefire	✓	✓	×	✓	✓	✓	×	✓
Kobo	✓	×	×	✓	✓	✓	×	✓
iBooks	✓	✓	×	✓	✓	×	×	✓
eBrary	×	×	×	✓	✓	×	×	✓
Marvin	✓	✓	×	✓	✓	✓	×	✓
Megareader	✓	✓	×	✓	✓	×	×	✓

Table 3 Kindle system page-turning features

Icon	Arrow	Animation	Swipe	Tap/Touch	Slider	Page Miniview	Enlarge Screen
✓	✓	✗	✓	✓	✗	✗	✓

According to Table 1 and Table 2, it was easy to find that Kindle application in iOS and Android system had some same features. For instance, Kindle in iOS and Android system did not have Icon, Arrow, animation; Kindle in iOS and Android system could both Swipe or tap the screen to turn the page and drag the Slider to turn the page; Kindle in iOS and Android system could enlarge the screen. The difference was kindle in Android system had Page Miniview but not exist in iOS system. Bluefire in Android did not have Tap/Touch function but in iOS it has. Kobo in Android has Arrow and page Miniview, but in iOS it did not. Blio in Android had Icon, Arrow and Slider, but in iOS it did not have. Blio, Bluefire, Kobo and Kindle are common applications in both Android and iOS.

Kindle and Txtr eBooks in Android, as shown in Table 1, did not have Icons and Arrows, but Kobo, Blio, Book Reader and Bluefire did use Icons and Arrows. All applications in Android could turn the page via Swipe and Tap/ Touch except Bluefire, which lacked the Tap/Touch feature, and all applications could enlarge the screen to change the size of font. Kobo was the only App to include page Miniview. Kindle, Kobo and Blio used Sliders but the other Apps did not.

In iOS system, as show in Table 2, all applications could turn the page via Swipe, Tap/Touch, and they could also enlarge the screen to change the size of font. Not all the applications had page Miniview. Kindle, Blio and eBrary did not have Icon and Arrow, Kobo has Icon but lack of Arrow. Kindle, Bluefire, Kobo and Marvin have Slider but others did not have. Except Blio, all applications did not have animation. As shown in Table 3, Kindle had Icons and Arrow, but did not have animation, Slider and page Miniview. It could turn the page via Swipe, Tap/Touch, and it also could enlarge the screen to change the size of the font.

3.3.2 Approaches to page turning

In the Android system and iOS system, these eBook-reading applications shared some similar approaches of page turning, such as Swipe and Tap/Touch. The interactive elements such as Icon, Arrow, Slider and page Miniview were also common features in these eBook reading applications. In this chapter, the following photographs of these Apps in use demonstrate these interactive features.



Figure 1 (Left): Android Swipe page turning in Kobo



Figure 2 (Right): The page roll like a physical book in Kobo

As shown in Figure 1 and Figure 2, when the researcher Swiped the screen, it was clear to see that the virtual page rolls up and looks like the real paper, and readers could Swipe the screen from left to right or reverse to turn the page.

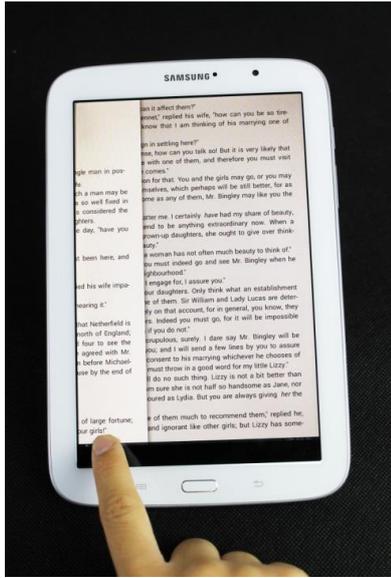


Figure 3 (Left): Android (Kobo) Swipe backward page turning animation

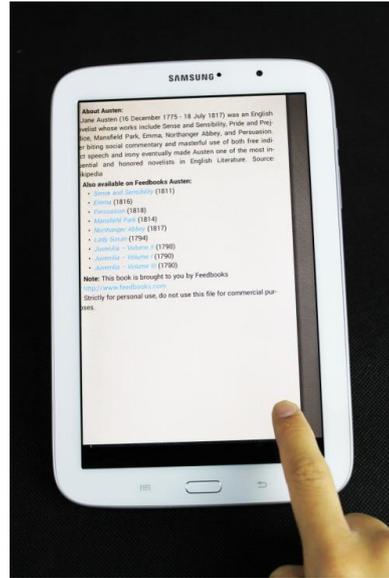


Figure 4 (Right): Android Kobo Swipe from left to right

The photographs above were taken from eBook reading application “Kobo” in the Android system, as shown in Figure 3 and Figure 4 readers could Swipe the screen from right side to the left side to turn the next page and Swipe the screen from left side to the right side to read the last page.



Figure 5 (Left): iOS Tap/Touch page turning in Kobo

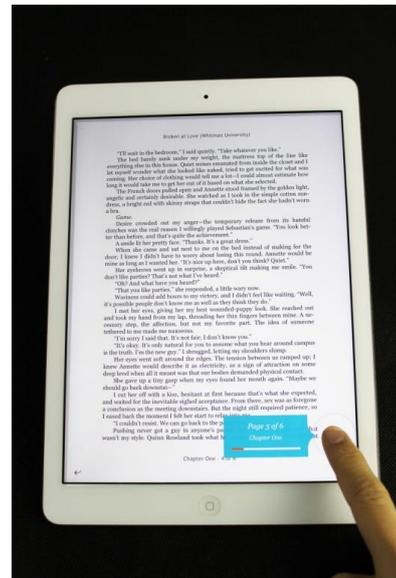


Figure 6 (Right): iOS Tap/Touch page turning in Kobo

The pictures above were from “Kobo” in the iOS system, as shown in Figure 5 and Figure 6. This approach of page turning was Tap/Touch, the reader could tap and touch anywhere on the screen to turn the page. Readers could tap the right corner at the bottom to turn the page, and there was a square to tell readers which chapter and the page number. This Tap/Touch function had an advantage, it was wherever readers tap the screen, the page always turns to the next page, and it was very convenient. Readers did not need to use only one spot to tap; they could tap the screen anywhere they want to turn the page.

3.3.3 Interactive elements for page turning

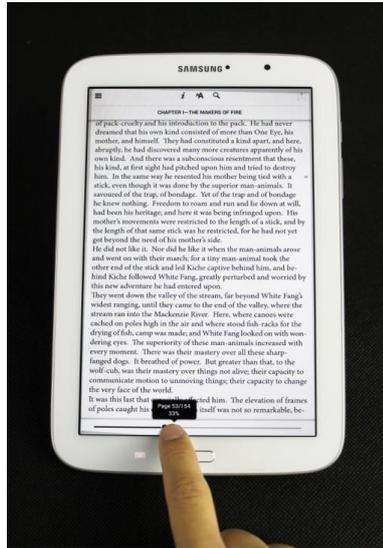


Figure 7 (Left): Android Slider page turning in Kindle

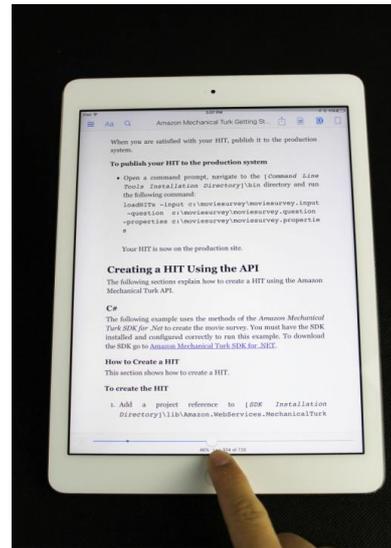


Figure 8 (Right): iOS Slider page turning in Kindle

The photographs above were from the Kindle the iOS system and Android system, as shown in Figure 7 and Figure 8. There was a Slider at the bottom of the screen, the reader could drag the small point to turn the page and change the chapter. When readers drag the Slider in the Kindle of Android, there emerged a little square to tell readers which chapter and the page number. In the Kindle of iOS system, it is a little bit different, there did not emerge a square which same as the Kindle of Android system, but there also told readers the page number and how much percentage they read bellow the Slider. Readers could drag from the left to the right to read forward, and dragged from the right to the left to read backward.

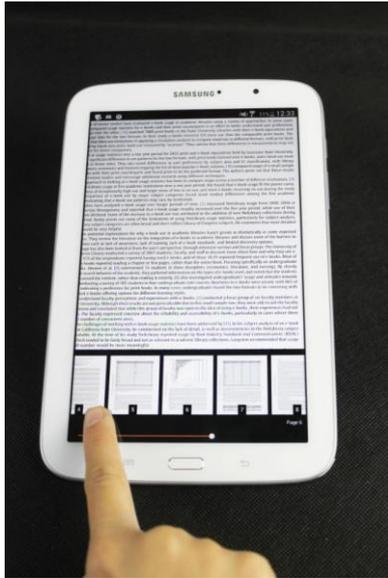


Figure 9 (Left): Android Page Miniview
in Kindle

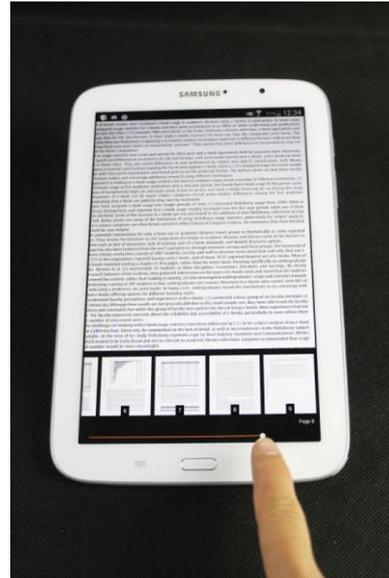


Figure 10 (Right): Android Page Miniview
page turning in Kindle

The photographs above were from “Kindle” in the Android system, as shown in Figure 9 and Figure 10. There were page Miniviews at the bottom of the screen. The reader could slide these mini illustrations to turn the page and change the chapter. Readers could Swipe the line of these page Miniviews from the right side to the left side to turn the new page; they could also read backward if they Swipe the line from the left side to the right side. If you had good eyesight, maybe you could even guess the approximate content in the page Miniview. The Page Miniview is a reduced version of the original page in eBook. Page Miniview is a replica of the original page except the size is much smaller than the original page and is usually found at the bottom of the screen. Readers could click Page Miniview the move to the page they want to read.



Figure 11 (Left): iOS Icons at the bottom in Blio

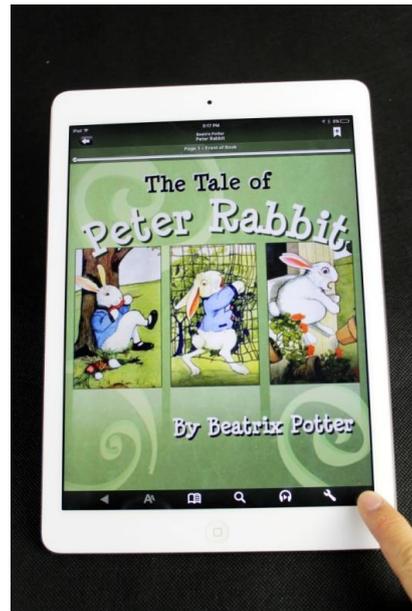


Figure 12 (Right): iOS Icons at the bottom in Blio

The photographs above were from “Blio” in the iOS system, as shown in Figure 11 and Figure 12. There were Icon and Arrow at the bottom of the screen. Icon includes many kinds of symbols such as Arrow, and these symbols have different function in the eBook. Arrow was included in Icon, it was a kind of Icon, but most kinds of Arrow just for turning the page. The first symbol was Arrow, readers could click it to turn the page backward. The second symbol could be classified into Icon, its function is to adjust the size of the font. The third symbol was for returning to the homepage. The fourth symbol was for indexing the chapter and content. The fifth symbol was for broadcasting the audio book, and the last symbol was for setting up the system.

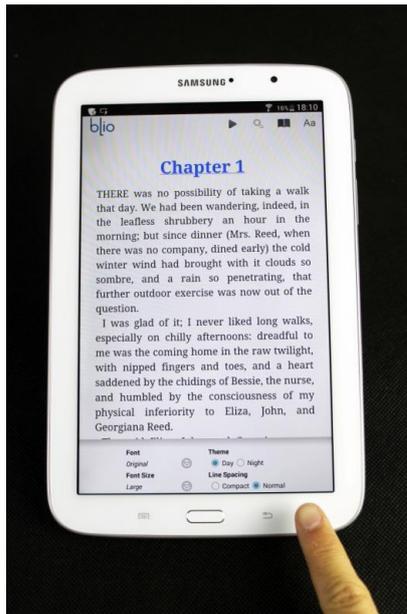


Figure 13: Android Icons at the bottom in Blio

As shown in Figure 13, in the Blio of Android system, there are four Icons at the top of the screen, the first one is an Arrow, and readers could click it to turn the next chapter. The second one was searching the content via key words. The third one was to return the homepage, and the last one was to adjust the size and change the colour of the font. At the bottom of the screen, readers could click any Icons to change the font. “Day” of theme was suitable for day, the background of the screen was light, and the “Night” was a darker background for reading environment. Front size was automatically adjusted for the size of the font.

3.3.4 Interactive elements in page turning

Besides the feature of swiping the screen to turn the page, several other representative features will be investigated in this section. Some interactive elements such as Icon, Arrow, animation, Tap/Touch, Slider, page Miniview and the function of enlarging the screen to change the size of font are included in this research. After taking photographs of each application and making Tables to contrast these interactive elements, a clear result became evident: all applications have Swipe and touch functions to turn the page, and enlarge the screen to change the size of font. Some interactive elements, such as page Miniview and animation, are rare in these applications. Whatever applications reader use,

the ability to Swipe the screen to turn the page is indispensable and necessary.

3.4 Discussion

In this chapter, ten different kinds of eBook reading applications on three device systems were investigated. The main purpose of this investigation was to discover different approaches of page turning in various kinds of eBook reading applications.

In the Android system there were six eBook reading applications downloaded in this device all eBook reading applications had a function of swiping the screen to turn the page, and readers could use fingers to enlarge the screen to change the size of font in all eBook-reading applications. Except Blio application, all of them lacked the animation function. Kindle and Txtr eBooks did not have an Icon and Arrow, but other four reading applications have these interactive elements. All of the reading applications could turn the page by tapping or touching the screen except Bluefire, this application lacks this page turning feature. Only Kobo has page Miniview in all applications. Txtr eBooks and Book Readers don't have Slider but other applications have.

In iOS system of iPad, there were eight eBook reading applications to be investigated. All of applications could Swipe, tap and touch the screen to turn the page, and all of them could enlarge the screen to change the size of the font. It is worth to notice that all these applications do not have page Miniview. Kindle, Blio and eBrary does not have Icons and Arrow, and Kobo does not have Arrows.

Kindle was a dedicated hardware for reading eBooks, readers could Swipe, tap or touch the screen to turn the page, and enlarged the screen to change the size of font, but this device did not have animation, Slider and page Miniview.

3.5 Conclusion

This chapter researched existing eBook reading applications in three different devices. The researcher compared the common features and differences for these existing page

turning approaches. The researcher hypothesizes that the page turning of different applications could give readers different reading experiences.

The result of this investigation was required to effectively conduct the research undertaken in the following chapter.

It was found that the main ways of page turning included Icon, Arrow, Swipe, Tap /Touch, Slider and Page Miniview. Icons and Arrows were used in a variety of ways, different shapes of Icons and Arrows has different function in eBook. Swipe and tap/Touch was practicable in almost tested application in Chapter 3. Some eBook reading applications had a Slider at the bottom of the screen, allowing readers to drag the Slider to change chapters or pages. Page Miniview showed the overview of each page to readers and it was practicable in few tested applications in Chapter 3. In most eBook reading applications, there was a searching square on the top right corner; readers could input chapter number or keyword to jump to the page and content they would like to read. All of these eBook reading applications had the function to enlarge the screen to change the size of font. Blio was the only application that has animation/audio element. Kindle was a dedicated hardware for reading eBooks, it had basic approach of page turning, such as Swipe, Tap/Touch to read book.

3.5.1 Answering RQ1

This chapter begins to answer RQ1: *What are the current norms for page turning in digital books?*

In Chapter 3, the researcher analysed the common features and differences between ten applications, and deduced that current norms for page turning in digital books including different interactive points and different page turning methods. Interactive points in page turning including Icon, Arrow while different page turning methods could be Swipe, Tap/Touch, Slider and Page Miniview. These interactive elements constituted the current norms for page turning in digital books.

Chapter Four – Page Turning Preference Study

The researcher conducted an investigation into the preferences readers have for six page turning methods, and found that the preferences of participants not only related to the page turning approaches themselves, but preference for page-turning methods depended on age, gender and occupation.

4.1 Introduction

The purpose of this research was to investigate the preference readers have for different approaches to page turning in eBooks, which related to RQ2 *What interactive features of page turning could affect readers' preference* and RQ3 *Is reader preference affected by reader background?* Thus, the researcher considered as many elements as possible relevant to page turning as identified in Chapter 3.

In Chapter 3 it was identified that in many eBook applications readers could Swipe the screen to turn the page, and they also could tap or touch the screen to jump to the different chapters. In some eBook reading applications, there was a Slider at the bottom of the screen, then readers could drag the Slider to jump to the page they want, but this feature was not very common in the applications the researcher investigated. Some applications had a Page Miniview to help readers scan the content of an eBook, especially when the e-article included pictures and photographs, the Page miniview seems to be extremely important to affect readers' reading experience. In the pervious case study (Chapter 3), the researcher concluded that interactive elements such as Icons, Arrows, Sliders, Swipe, Tap/Touch and Page Miniview are common features for page turning in eBook reading applications. In this chapter these page-turning methods have been investigated to discover which page-turning methods in eBook applications are preferred by readers.

In this investigation, the researcher will observe a range of readers while they use six different types of page turning in an eBook setting. The readers will then be interviewed

to ascertain their preferences for page-turning methods in digital reading situations on mobile devices.

4.2 Method

In this chapter, the researcher aims to find the preference of readers for page turning in different eBook reading applications.

This study involved a reader using the *Page turning Research App* (see Section 4.3), and then answering interview questions (see Figure 15: Interview Questions). In Part one of the investigation the readers were provided with the Page turning Research App and asked to follow on-screen prompts which instructed the user how to interact with the eBook, and then requested the user read a few pages while using the interaction method that had been shown. After the user interacted with all six methods in the Page Turning Research App each user was given a Likert scale to describe how they felt about each page turning method (see Figure 14). In Part two of the investigation the readers were asked questions relating to the six page-turning methods, and were asked to give reasons for their preferences.

4.2.1 Investigation for Participants (part 1)

Here are the interview questions that were designed for the participants.

In this first part of the experiment, the participants were asked how easy they felt it was to use each of the page-turning methods. For each approach, participants were asked to indicate on a Likert scale how easy they felt each page turning method to be. The five steps on the Likert were “very easy, slightly easy, neither easy nor hard, slightly hard, very hard”; the six page-turning methods were Icon, Arrow, Swipe, Tap/Touch, Slider, Page Miniview. Participants were also asked to give the reason for their responses to each approach.

Research Interview Form

Participant ID Number:
 Age:
 Gender:
 Academic Qualification:
 Occupation:

How easy did you find using:



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WAIKATO
Te Whare Wānanga o Waikato

Icon	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Arrow	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Swipe	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Tap/Touch	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Slider	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Miniview	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					

Figure 14: Interview Questions

4.2.2 Investigation for Participants (part 2)

In Part 2 participants were asked questions, which related to their preference and experience using the six devised page-turning methods. The original researchers notes sheet is shown in Figure 15.

Part 2: The questions of preference of participants

Question	Content
1	Which approach did you like best to turn pages? Why?
2	Which approach was the easiest to turn pages? Why?
3	Which approach was the most accurate to turn pages? Why?
4	Which approach was the intuitive to turn pages? Why?
5	Do you read e-article for academic information reading? How often?` Times per week Times per month Times per year
6	Do you read e-article for pleasure reading? How often? Times per week Times per month Times per year
7	Do you think one of these approaches is more appropriate for academic information reading? Why
8	Do you think one of these approaches is more appropriate for pleasure reading? Why?
9	Is there anything else about turning pages when reading that you would like to discuss?

Figure 15: Interview Questions

4.3 Design of the page turning research app

The researcher devised six different approaches of page turning based on the findings of Chapter 3, which include Icon, Arrow, Swipe, Tap/Touch Slider and Page Miniview. These were implemented in an Android Application, which the researcher will refer to as the *Page turning Research App* and was tested with users on a Nexus 7 Tablet.

This application included six sections, one for each of the six page-turning methods that were being tested. In each section was an instructional video for one of the six page-turning methods to demonstrate how the user would use method, followed by a sample chapter of book pages where the user could interact with the page turning method that had just been demonstrated in the video, and ending pages for the entire application.

When participants opened the application, the first page was a welcome page (see Figure 16), they then clicked “continue” to move to the first video for method 1. After they watched the first video, they could click “continue” to enter the page turning example of method 1. Once they had tried method 1, they could click “continue” for the next video and method. They repeated these same steps for each approach until they had completed all six page-turning methods.

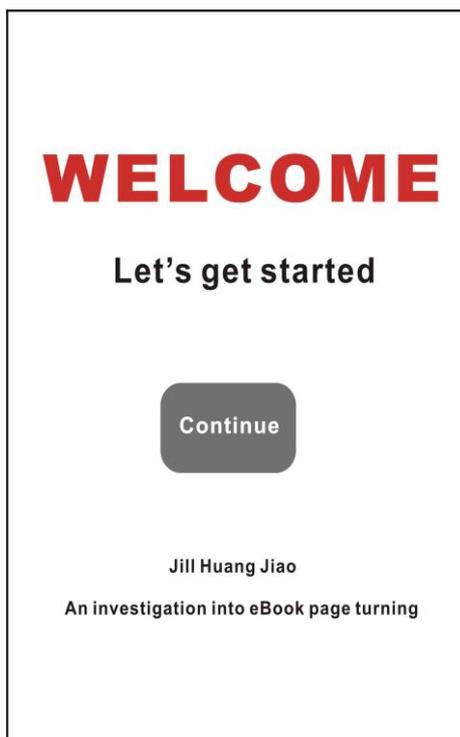


Figure 16: Welcome Page

4.3.1 Common design elements for all methods

The researcher used the text “55 Ways to Have Fun with Google”² by Author Philipp Lenssen as reading material for the study. Three Icons were present on all pages of the testing app that were not the research objects in the six devised page-turning methods. At the top right corner of the page there were three Icons and they had different functions. The first one was to search chapters, the second one was to return to the home page and the last one was to adjust the size of the font.

² Philipp, Lenssen. (2006). 55 Ways to Have Fun With Google. Creative Commons Attribution-NonCommercial-ShareAlike 2.0 License.
<https://www.55fun.com>.

4.3.2 Method 1 - Icon

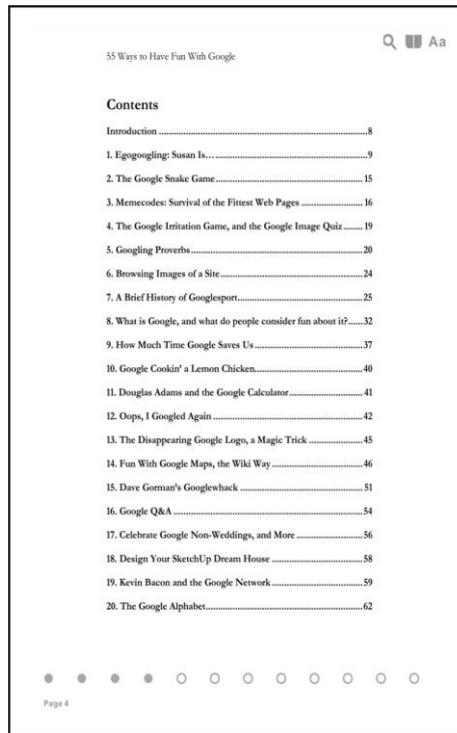


Figure 17: Method 1 for page turning – Icon

The first approach is shown in Figure 17, each dot at the bottom of the page represents a single page. The reader could tap the little dot to turn the page, or just click any dot to jump to any page. In the example for this study 12 dots were present at the bottom of the page, but this could be changed for different numbers of pages. This method was different from the Sliders seen in the case study, the devised Slider was tapping, not dragging to turn pages, this method of turning pages was not seen in the case study in Chapter 3. At the bottom left of page it shows the reader the number of the page.

4.3.3 Method 2 - Arrow

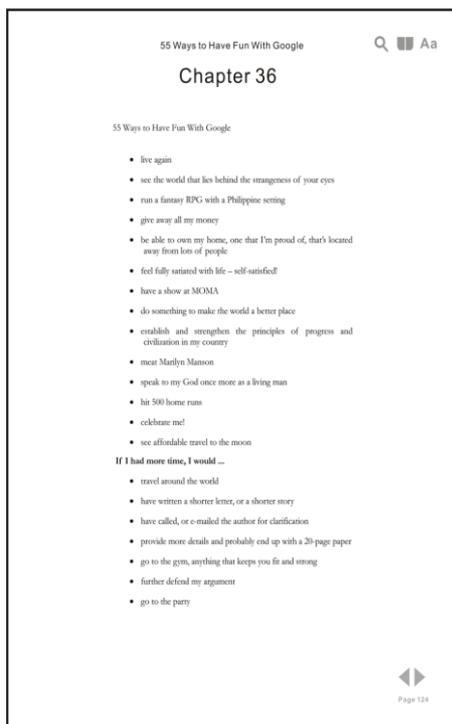


Figure 18: Method 2 of page turning – Arrow

The second approach, as shown in Figure 18, is simple, the reader just needs to click the right Arrow to read forward and click the left Arrow to read backward. This approach was similar to a page turning approach on the Kindle device. In both the devised Arrow method and on the Kindle device in Chapter 3, readers could click the Arrow to turn the page. In the Kindle device, the right Arrow was to turn the next page and the left Arrow was to go back to the last page, which was same as the devised Arrow method for this study. At the bottom right side of page it shows the reader the number of the page.

4.3.4 Method 3 - Swipe

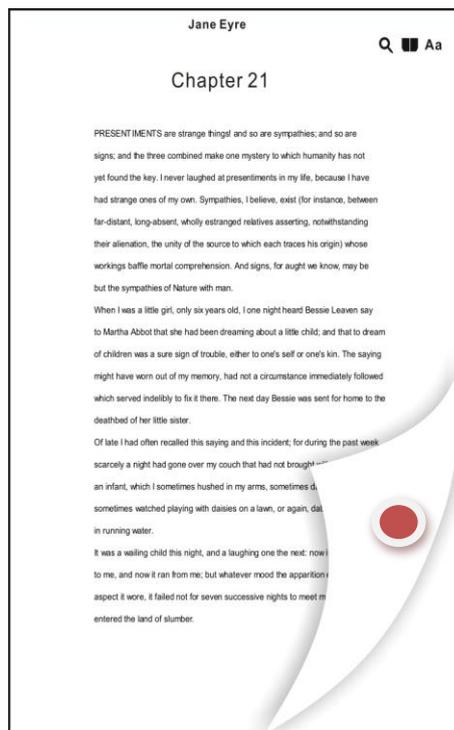


Figure 19: Method 3 of page turning - Swipe

The third approach, as shown in Figure 19, is similar to Kobo in the Android system, the reader could Swipe the screen from right to left side to turn the page, and this page turning imitates a physical book. It showed the animation of the page turning, the page scrolling animation was similar to readers turn pages in print books. The red dot only shows in the video to indicate where the screen is being touched, it is not included on the page turning surface.

4.3.5 Method 4 - Tap/Touch



Figure 20: Method 4 of page turning – Tap/Touch

The fourth approach, as shown in Figure 20, is a popular approach for page turning, as discovered in Chapter 3; the Tap/Touch method in the application was similar to the devised one, as shown in Section 3.3.2 in Chapter 3. When the reader's finger touches the screen, the page is turned. In the investigation, participants clicked or tapped the right side of the screen to turn to the next page, and clicked the left side of the screen to read backward. The red dot only showed in the video, it was not included on page turning surface. At the bottom left of page it shows the reader the number of the chapter and the right side shows them the page number.

4.3.6 Method 5 - Slider

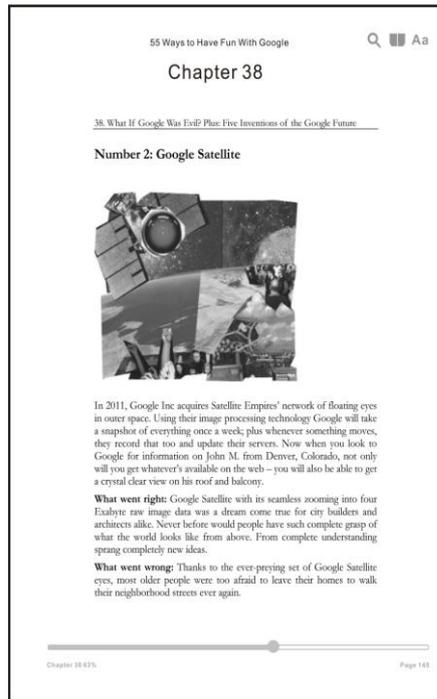


Figure 21: Method 5 of page turning – Slider

The fifth approach, as shown in Figure 21, is similar to Kindle, Bluefire, Blio and Kobo in the Android system and Kindle, Bluefire, Kobo, Marvin in the iOS system; readers could drag the dot along the bar to turn the page. Each page corresponded to an equal length on the Slider. At the bottom left of page it shows the reader the number of the chapter and what percentage they have read, the right side shows them the page number.

4.3.7 Method 6 – Page Miniview

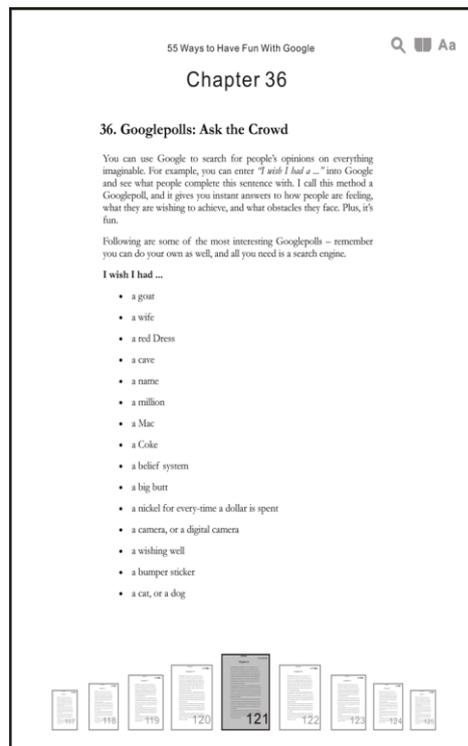


Figure 22: Method 6 for page turning – Page Miniview

The sixth approach, as shown in Figure 22, is the page Miniview for page turning. The page Miniview in the middle, which was also the largest, represents the current page. In the example seen in Chapter 3 readers could Swipe the bottom of the screen from right to left for reading forward, or Swipe the screen from left to right for reading backward. This approach used in Kindle in the Android system. In the Kindle application, the page turning method scrolls through the page but in this devised method, participants could only tap the Miniview to turn pages. In this study, the Miniviews are different sizes from middle to two sides, which was different from the Kindle; Kindle had the same size for all Page Miniviews. When participants click the page, the current page will shift to the middle and enlarge more than the others. At the bottom of the screen, each page has a page number.

4.4 Results

Here the researcher describes the results of this study.

4.4.1 Participants

Thirty individuals were recruited to participate in the investigation; all of them had a tertiary qualification and were 18 years or older. The researcher planned to include people who were familiar with eBooks. The researcher recruited participants in the library of the University of Waikato as well as in the Faculty of Computing and Mathematical Sciences at the University of Waikato, because it was a suitable place to find people who have some knowledge about eBooks.

As seen in Figure 23, there were 15 participants between 18-25 years old, the researcher found that most of them were Bachelor students, and most told the researcher that they always used iPad tablet to read eBooks. Eight participants were between 26-35 years old. Three participants were between 36-45 years old. The researcher also found four participants over 46 years old at University of Waikato.

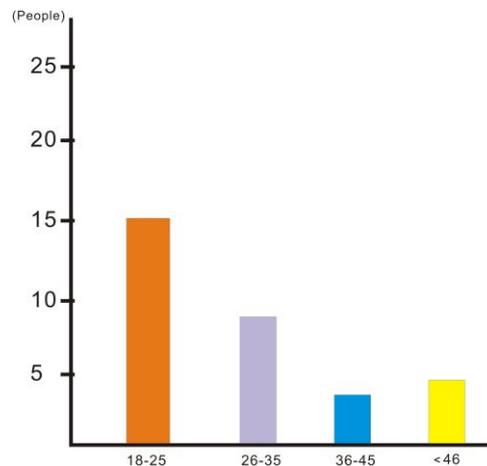


Figure 23: Participants age

As seen in Figure 24, of the participants in this study, 22 of them were females, and eight of them were males.

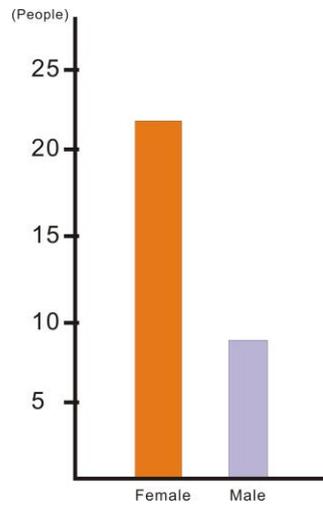


Figure 24: Participants Gender

Figure 25, shows that 24 of the participants were students, four of them were lecturers and two of them were library assistants.

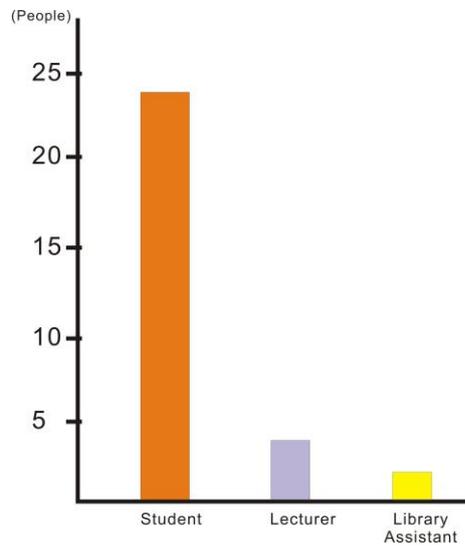


Figure 25: Participants Occupation

In Figure 26 the participants cover a range of qualifications, 16 participants were Bachelor students and all of them were still studying this degree in university. Seven participants were Masters students and two of them had finished their degree, five of them were still studying in university. Seven participants had PhD qualifications and all of them had finished their education.

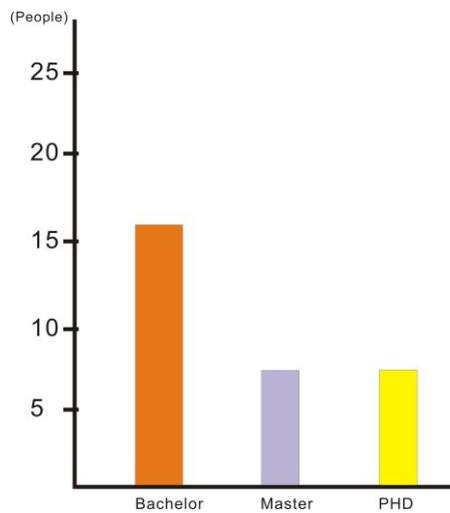


Figure 26: Participants Qualification

4.4.2 The frequency of reading eArticles

According to Question 5 and 6 of Part 2 of the interview, as shown in Figure 27, seven participants only read e-articles for academic information, two participants only read e-articles for pleasure reading, and 21 participants read e-articles for both pleasure and academic purposes.

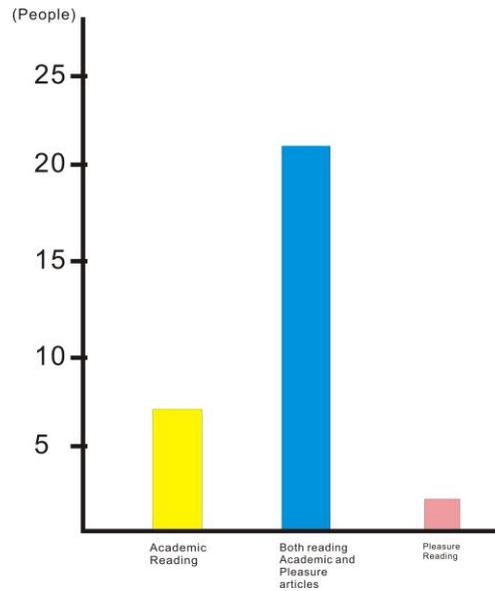


Figure 27: The frequency of reading eArticle

4.5 Ease of use for page turning

The below section explains the responses to Part 1 of the interview asking participants to rate the ease of use for each of the page-turning methods. According to the investigation Part 1, participants had different preferences for which of the six devised page turning methods they felt were easiest to use.

4.5.1 Sense of ease for Icon

The researcher gave participants the devised application to use and demonstrated six methods to participants at the beginning of the session with them. In the method of page turning, Icon, there are 12 dots at the bottom of each page; every dot represented one page. In this investigation, participants could tap a dot to turn the page. As can be seen in Figure 28, 13 participants considered Icon as very easy to use, and they gave the different reasons, five of them described the Icon method as easy to understand, while another eight people described this method as normal. Eight participants thought this approach is slightly easy; three of them describing the Icon method as easily acceptable, while 5 of them described it as normal. Four participants considered this approach was neither easy nor hard to use, all of them thought the Icon method is easy to understand, but not very

convenient. Five participants thought this approach is slightly hard to use, and all of them thought it was hard to know which dot represented which page. None of them thought it is very hard to use. Many participants described this approach as normal, there were no particular things that made them feel it was hard to use.

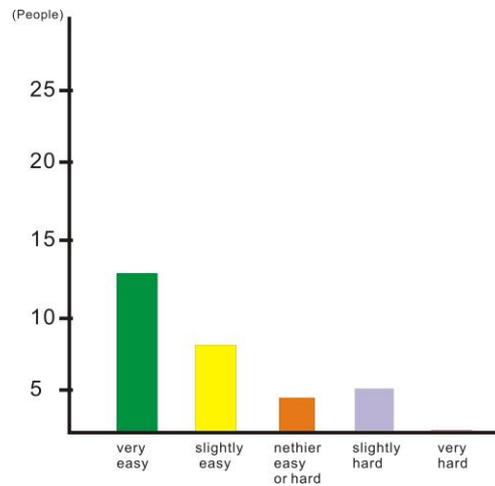


Figure 28: sense of ease for Icon

4.5.2 Sense of ease for Arrow

The second page turning method was Arrow; there are two Arrows at the bottom of the page, a left Arrow and a right Arrow. Participants clicked the right Arrow to read forward and clicked the left Arrow to read backward. According to Figure 29, 13 participants considered the Arrow page turning method to be very easy to use, 10 of them described this method as easy and recognizable, three of them described it as normal. Ten participants thought this approach was slightly easy, eight of them thought it was easy to turn pages if you follow the Arrow direction, and two of them thought the Arrow is easily understood. Two participants considered this approach was neither easy nor hard to use, because it was just very normal. Three participants thought this approach was slightly hard to use, because the gap between Arrows was too narrow, it was hard to touch with your finger. The final two participants thought it is very hard to use, because the Arrow was too small.

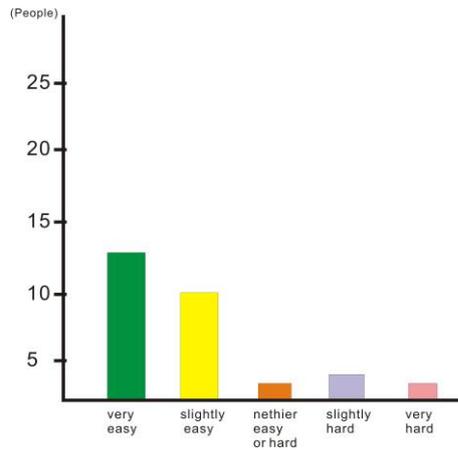


Figure 29: Sense of ease for Arrow

4.5.3 Sense of ease for Swipe

The third approach is swiping the screen to turn the page; this approach of page turning imitates a physical book. Participants could see an animated page turn when they Swipe the screen. According to Figure 30, 15 participants considered Swipe very easy to use, and ten of them described the Swipe method as easy, five of them described this approach as like a real book. Three participants thought this approach is slightly easy, because it looked like a real book, people could quickly understand how to use this approach to turning pages. Seven participants considered this approach was neither easy nor hard to use, because it was normal. Five participants thought this approach was slightly hard to use, because the turning speed was slow. None of them thought it is very hard to use, all participants thought this page turning method was not complicated.

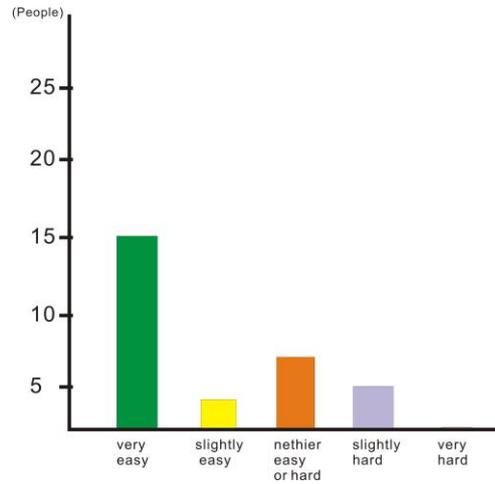


Figure 30: Sense of ease for Swipe

4.5.4 Sense of ease for Tap/Touch

The fourth approach is Tap/Touch. Participants could tap anywhere on the right side of the screen to turn to the next page, and tap on the left side to read backward. According to Figure 31, 25 participants considered Tap/Touch is very easy to use, and 18 of them describe this approach as fast to turn pages, while seven of them describe it as easy to touch the screen to turn pages. Two participants thought this approach was slightly easy, because it was fast. One participant considered this approach is neither easy nor hard to use, because it was similar to most page-turning methods on the iPhone. Two participants thought this approach is slightly hard to use, because they could not jump more than one page. None of them thought it is very hard to use, all participants described they feel Tap/Touch was easy to use because they only needed to touch the screen, not a specific position.

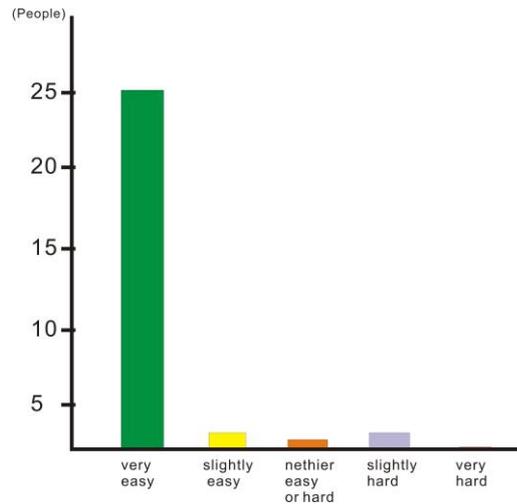


Figure 31: Sense of ease for Tap/Touch

4.5.5 Sense of ease for Slider

The fifth approach is Slider; each page corresponded to an equal length on the Slider. Participants could click the Slider to turn the page. According to Figure 32, six participants considered Slider was very easy to use, because the Slider was easy to touch to turn pages. Four participants thought this approach was slightly easy, because it was easy to understand. Four of them considered this approach was neither easy nor hard to use, it was just a normal method of page turning. Fifteen participants thought this approach was slightly hard to use, and 11 of them described this approach as not clear for jumping to a specific page, while four of them thought it was hard to know how to find the page they wanted. One participant thought it was very hard to use, because they thought it was hard to immediately understand how to use this approach.

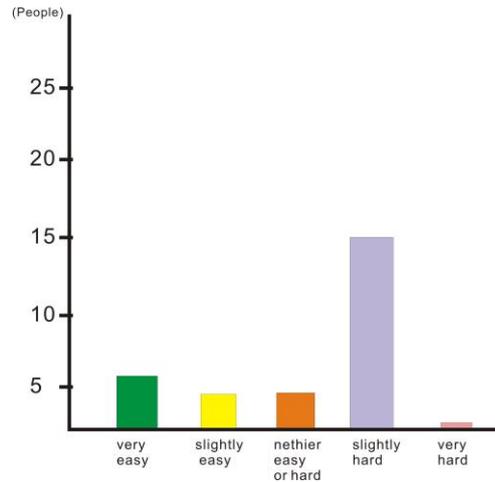


Figure 32: Sense of Ease for Slider

4.5.6 Sense of ease for Page Miniview

The last approach is Page Miniview; there are 9 small page illustrations with page numbers at the bottom of the page. When participants click any Miniview Icon at the bottom, the page displayed will change to the clicked page and the Miniview page will move to the middle of the bottom line. According to Figure 33, 15 participants considered Miniview to be very easy to use, and nine of them described the Miniview approach as easy to see the page overview, while six of participants described it is easy to know the page number in small images. Ten participants thought this approach was slightly easy, the reasons given were the same as by the people who thought this approach was very easy. Two participants considered this approach was neither easy nor hard to use, because it was normal. Three participants thought this approach was slightly hard to use, because this approach was new and they were not familiar with it. None of the participants thought it was very hard to use.

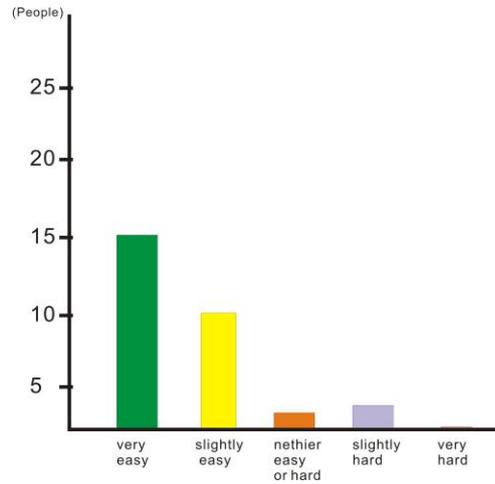


Figure 33: Sense of ease for Page Miniview

4.6 Interview results

This section explains the responses to Part 2 of the questionnaire asking participants to comment on which page-turning methods they liked best, found easiest, most accurate, most intuitive, and which they felt were best suited to academic and pleasure reading.

4.6.1 The best of the six approaches

Figure 34 shows the page turning approach that participants thought was the best of the six they were shown. The bar chart records the responses of participants according to Question 1 (Part 2), 'Which approach did you like best to turn pages? Why?'

The chart in Figure shows which of the six page-turning methods the 30 participants chose as the approach they thought was best for turning the page. Only one participant considered Icon as the best approach to turn the page, because the Icon was interesting. No participants liked the arrow best to turn the page; many thought the arrows were too small to touch. Three participants chose Swipe as their favourite approach to turning the page, they liked the feeling, which they thought was similar to reading a real book. Six participants liked Page Miniview best, because they could preview the page content and page number, which is convenient for finding information. There were only two participants who preferred the Slider to turn the page; these two participants thought this

approach was more accurate to turn pages than others. The bar chart in Figure illustrates that most participants liked the Tap/Touch method best, almost all of them thought this approach was fast to turn pages and they could turn pages without needing to click a specific position. There were 15 participants who chose the Tap/Touch method as their best for turning the page.

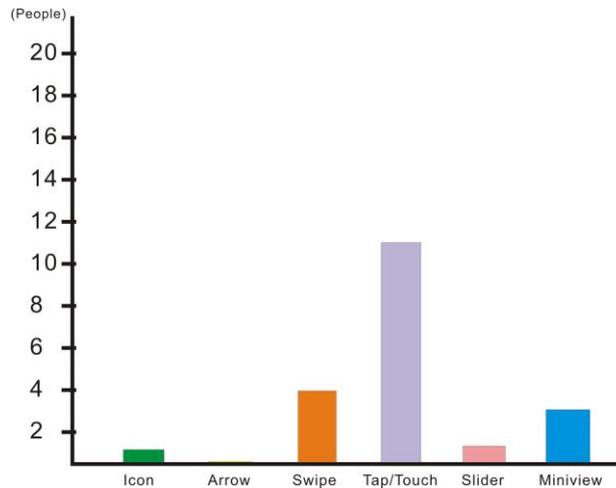


Figure 34: The preference of participants

4.6.2 The easiest of the six approaches

The responses to the investigation Question 2 of Part 2, 'Which approach was the easiest to turn pages? Why?', are summarized in Figure 35. Three participants thought the Icon was easiest for turning pages, because it was easy to use. Four participants thought the Arrow was the easiest one, because they thought this approach was very intuitive, which they could understand it best. Four participants thought Swipe was the easiest approach to turn pages, because they thought it was similar to real books; readers were familiar with swiping paper pages. There were 14 participants who considered Tap/Touch easiest for them, 12 of them described this approach as fast to turn pages and saves time, and the other two participants thought it was convenient to touch because they did not need to find a specific position to click. Four participants thought the Slider was very easy, they described it was easy to jump pages, and they could click the Slider without hesitating. Only one participant described Page Miniview as easiest, because it was intuitive to show

the page number and page overview to readers.

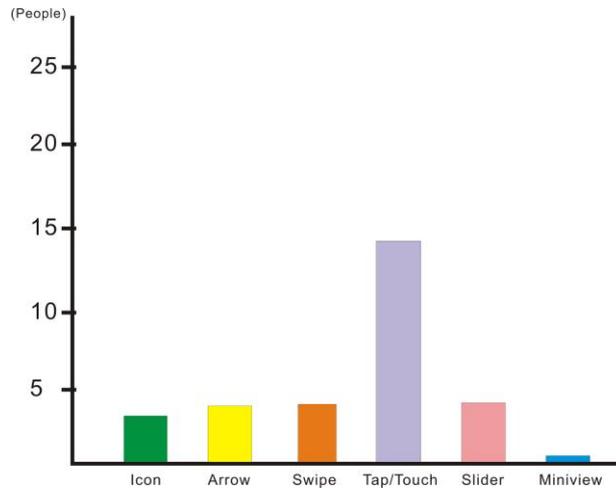


Figure 35: The ease of six Approaches

4.6.3 The most accurate of the six approaches

According to the investigation Question 3 (Part 2), results of the question ‘Which approach was the most accurate to turn pages? Why?’, are shown in Figure 36. Three participants thought the Icon method was the most accurate approach to turn pages, because it was intuitive and easy to touch the dots. Six participants chose the Arrow, 3 of them thought this approach was intuitive, the other three people thought it was easy to follow the Arrow direction to turn pages and accurate for turning pages one by one. Four participants chose Swipe, because they thought it was like a real book, so they knew how to use this approach quickly. Eight participants chose Tap/Touch, because this approach could turn pages one by one. Nine participants chose Page Miniview, two of them described this approach as intuitive, the other seven people felt they could scan the Page Miniview and know the page number, so it was accurate to turn pages. None of the participants chose the Slider as the most accurate approach.

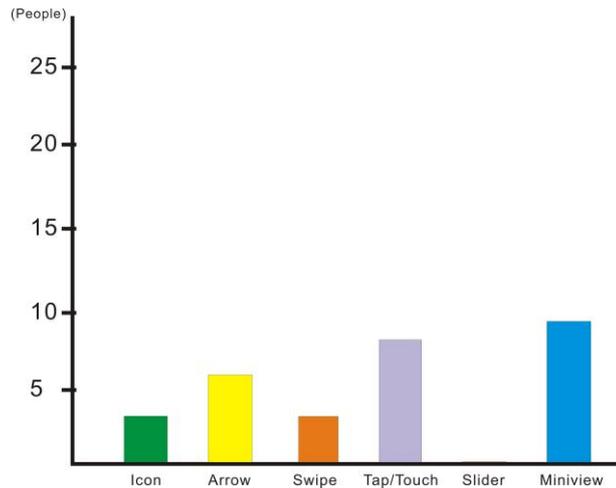


Figure 36: The accuracy of six approaches

4.6.4 The intuitiveness of the six approaches

According to the investigation Question 4 (Part 2), ‘Which approach was the most intuitive to turn pages? Why?’, responses are shown in Figure 37. None of the participants chose the Icon method as the most intuitive method. Seven participants chose the Arrow as the most intuitive approach, two people described this approach as straightforward and five people thought it was easy to follow the Arrow direction to turn pages. Five participants chose Swipe, because it was like a real book. Three participants chose Tap/Touch because they did not need to waste time to think how to use it. Two participants chose Slider because it was easy to understand. 13 participants chose Page Miniview; because they could preview the page in Miniview and know the specific page number they want to read.

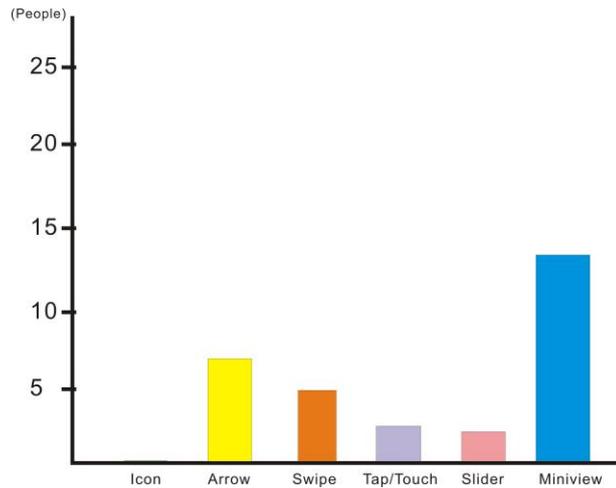


Figure 37: The intuitiveness of six approaches

4.6.5 The appropriate approach for academic reading

Figure 38 summarizes the results to the investigation Question 7, ‘Do you think one of these approaches is more appropriate for academic information reading? Why?’. This section also related to Question 5 Part 2 (see Section 4.4.2); most of the participants both read academic articles and pleasure articles, there was a small proportion of participants who only read academic articles or pleasure articles. There were 27 participants who read academic eArticles and three participants who never do this. None of the participants thought the Icon method was appropriate for academic reading. Four participants chose the Arrow because it was easy to understand. Swipe was chosen by four participants because this approach was similar to real books, so readers could adapt to use this approach quickly. Six participants chose Tap/Touch because it was fast to turn pages, readers did not need to waste time on waiting for page turning, and thought it would be helpful for finding information quickly. Four participants chose the Slider because it was easy to touch. Twelve participants chose Page Miniview because readers could preview the page content and page numbers, which saved time when searching for useful information.

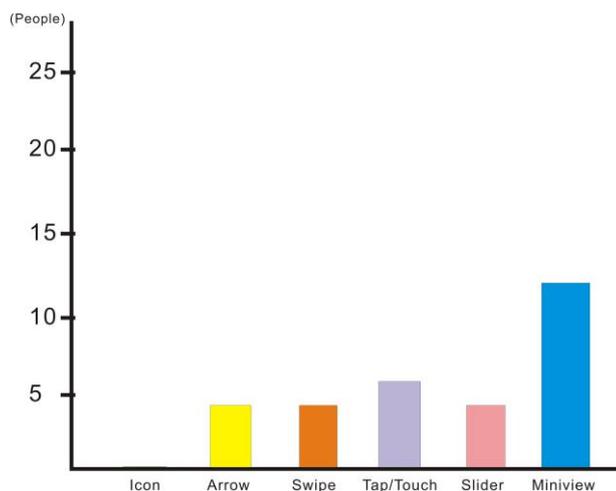


Figure 38: The appropriate approach for academic reading

4.6.6 The appropriate approach for pleasure reading

Figure 39, summarizes the investigation Question 8, 'Do you think one of these approaches is more appropriate for pleasure reading? Why?' This section also related to Question 6 Part 2 (see Section 4.4.2); most of participants both read academic articles and pleasure articles, there was only a small proportion of participants who only read academic articles or pleasure articles. There were 21 participants who said they read eArticles for pleasure and nine participants who said they never did. None of the participants chose Icon as the most appropriate approach for pleasure reading. Four participants chose the Arrow because it was easy to understand. Four participants chose Swipe because it was similar to real books, readers enjoyed the page turning animation and slow reading experience. Six people chose Tap/Touch because it was fast to turn the page, they had a common opinion was that if they could not wait to read the next page or chapter in a novels they liked, they could quickly turn to the next page. Four participants chose Slider because it was interesting. Twelve participants chose Page Miniview, two of them thought this approach was easy to skip pages, ten of them thought this approach was appropriate for pleasure reading because readers could preview the content and page numbers in Miniview.

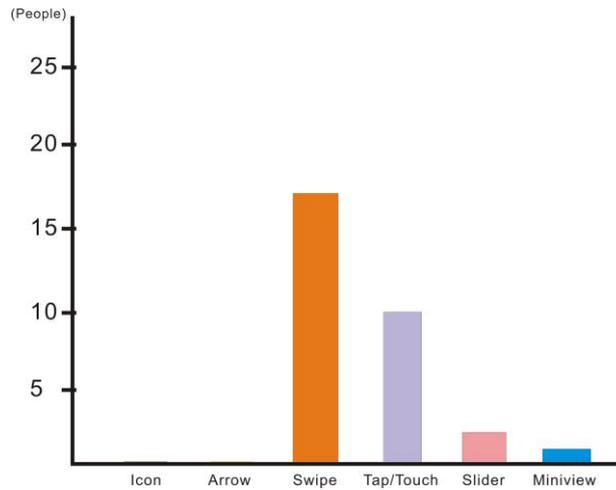


Figure 39: The appropriate approach for pleasure reading

4.6.7 Best approach for different age groups

In order to analyse and conclude the preference of participants for each approach and which one they liked best, the researcher referred to the investigation Part 2 Question 1: Which approach did you like best to turn page? The researcher also analysed the result data from the investigation answers of Question 1.

Below are bar charts to illustrate the preference of different age groups. In Question 1, Figure 40, the researcher asked the participants which approach they considered as the best approach to turn the page. There were 30 participants who took part in this investigation. There were 15 participants between 18 to 25 years old, eight participants between 26 to 35 years old, three participants were between 36-45 years old and four participants were 46 years old or over.

There were 15 participants between 18 – 25 years old. According to the chart in Figure, none of participants who were between 18 to 25 years old chose Icon, Arrow or Miniview as the best approaches to turn the page, four participants who were between 18 – 25 years old thought Swipe was the best approach to turn the page. Tap/Touch was considered as the best approach among age 18 – 25, there were nine participants who chose this one as the best approach to turn pages, and two participants liked Slider best to turn the page.

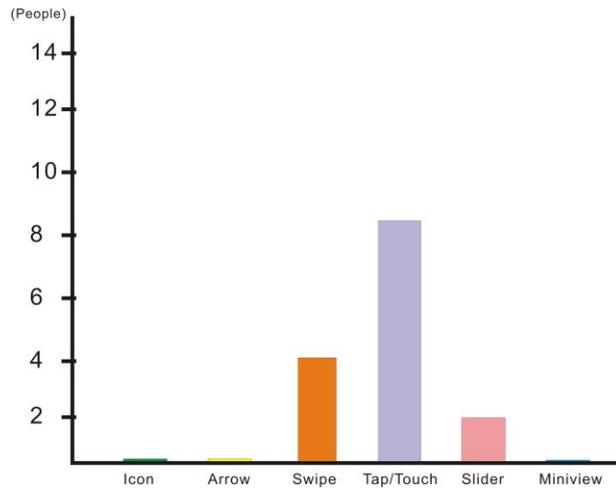


Figure 40: The preference of age 18 – 25

There were eight participants between 26 – 35 years old. According to the chart in Figure 41, there were two participants between 26-35 years old respectively who liked Icon and Swipe to turn the page. None of participants between 26 – 35 years old preferred Arrow or Slider was the best approach to turn the page. Page Miniview and Tap/Touch were considered the best approach to turn pages among age 26 – 35, there were three participants who chose this one as the best approach to turn pages.

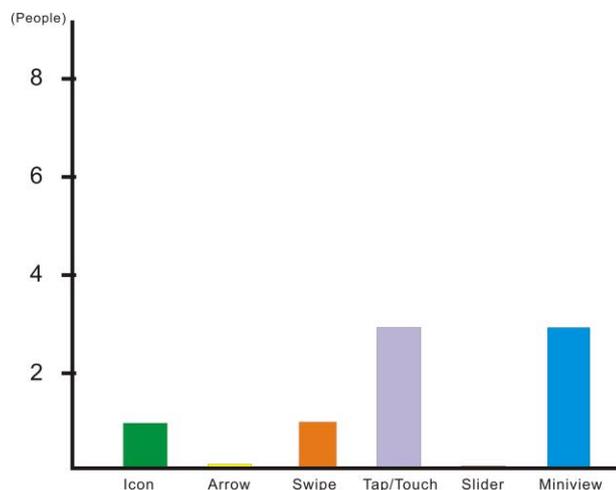


Figure 41: The preference of age 26 – 35

There were three participants between 36-45 years old. According to the chart in Figure 42, none of the participants between 36 to 45 years old thought Icon, Arrow, Tap/Touch or Slider were the best approaches to turn the page. One participant thought Swipe was the

best approach and two participants liked Page Miniview best.

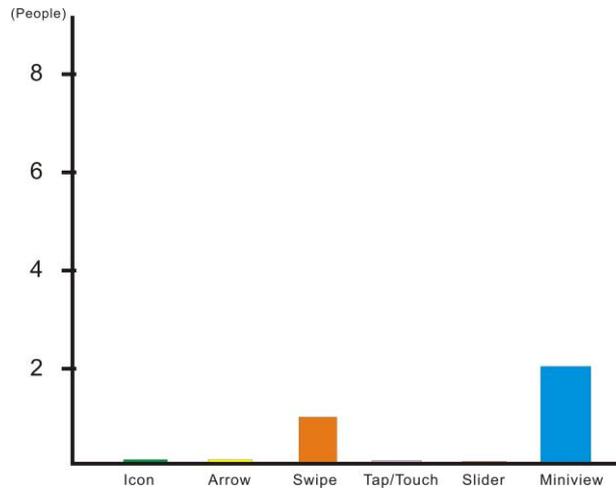


Figure 42: The preference of age 36-45

According to Figure 43, there were four participants over 46 years old, none of these participants liked Icon, Arrow, Tap/Touch or Slider best, three participants liked Swipe and one participant preferred Page Miniview.

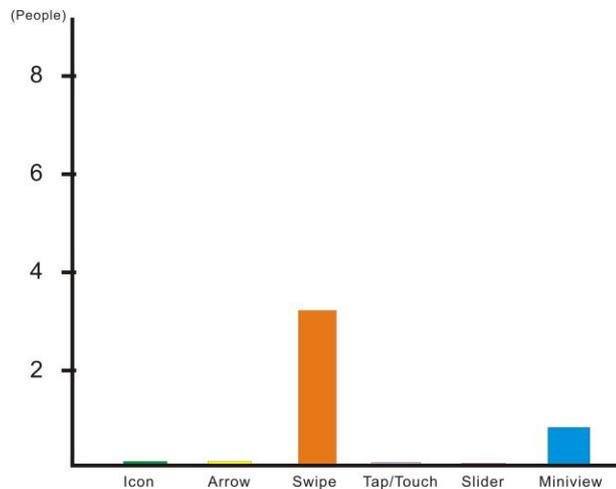


Figure 43: The preference of age over 46

There were 13 of the 15 participants who were between 18 to 25 years old liked Tap/Touch. Most young people preferred Tap/Touch. Four of eight Participants who were between 26 to 35 years old preferred Tap/Touch and Page Miniview. There were three People who were between 36 to 45 years One of them liked Swipe and another two of them Page Miniview. Three of the four participants who were over 46 years old preferred

Swipe and one of them liked Page Miniview. Older people were more likely to think that Miniview and Swipe were best over other age groups, while young people had a trend to chose Tap/Touch as the best approach to turn the page.

4.6.8 Best approach for different genders

In order to analyse and conclude the preference of different genders for each approach and which one they liked best, the researcher referred to the investigation Part 2 Question 1: Which approach did you like best to turn page? The researcher also analysed the result data from the investigation.

As shown in Figure 44 and Figure 45, the researcher found that ten of 22 females liked Tap/Touch; most females liked this approach to the turn page. Four of eight males preferred Tap/Touch. Tap/Touch was most popular approach with both genders. The ten females who liked Tap/Touch all thought this approach was fast to turn pages and saved the reading time. Five males who liked this approach because they liked to turn pages without having to click a specific position.

Only one female liked Icon best because she thought it was accurate to turn pages one by one. No males liked Icon because they all thought the Icon was too small to touch. The interesting thing was that no females or males liked Arrow, because they thought Arrow was similar to Icon and these interactive points were too small.

There were two of eight males and three of 22 females who liked Swipe best, the proportion of males who liked this approach was larger than females. Females and males thought this approach was best to turn pages because they enjoyed the slow reading experience. Other females and males did not chose this approach as the best page turning method to turn pages because they thought this approach was too slow and wasted time.

One of eight males and one of 22 females liked the Slider, both genders thought this approach was interesting so they liked it, but most females and males thought this approach was confusing and they did not know how to click a specific position to turn to

pages they wanted to read.

One of eight males and four of 22 females liked Page Miniview, they thought this approach was clear to see the page number on Miniview, which could help them search the page they wanted to read quickly.

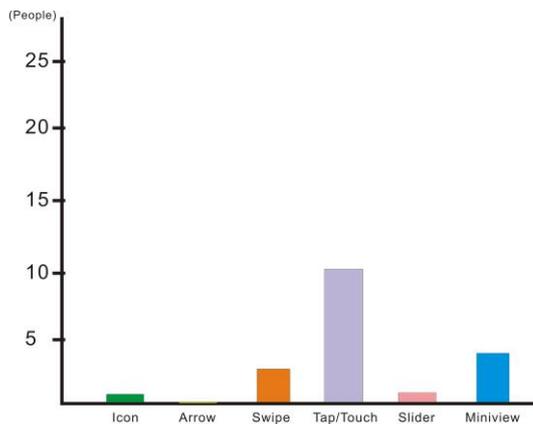


Figure 44: Best approach for females

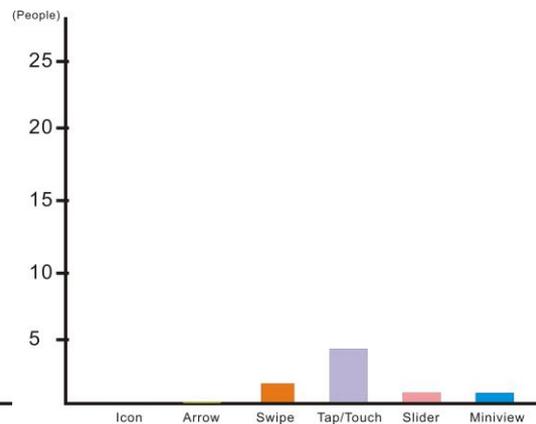


Figure 45: Best approach for males

4.6.9 Best approach for different occupations

In order to analyse and conclude the preference according to the occupation of participants for each approach and which one they liked best, the researcher referred to the investigation Part 2 Question 1: Which approach did you like best to turn page? The researcher also analysed the result data from the investigation.

As shown in Figure 46, most students liked Tap/Touch to turn page, there were 13 of 24 students who chose this approach. Students liked Tap/Touch best because they thought this approach was fast to turn pages and saved time. Two of 24 students thought Icon was best approach and three of 24 students chose Arrow as the best approach, they thought these two approaches were similar and easily to understand. The researcher considered the possible reason why these participants chose Icon or Arrow because using Icon and Arrow to turn pages could avoid missing pages, they could turn pages one by one. Four of 24 students thought Swipe was the best approach, they enjoyed the slow reading experience and it seemed like a real book. The other two students liked Page Miniview

best because they thought it was easy to find the page they wanted to read when they scanned the page numbers on Miniview. None of students thought Slider was the best approach because they thought Slider was not clear to tell readers the specific position for page turning.

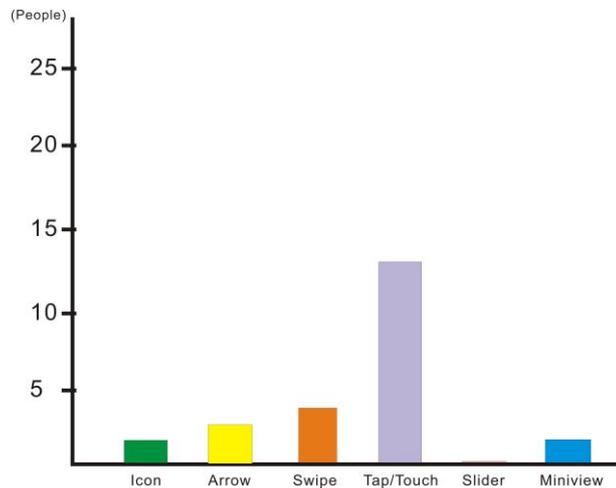


Figure 46: Best approach for students

As shown in Figure 47, there were four lecturers, and one of them thought Tap/Touch was the best approach; they liked to turn pages fast. The other three lectures liked Page Miniview because they thought it was clear to know the page number on Miniview and the specific page they wanted to read.

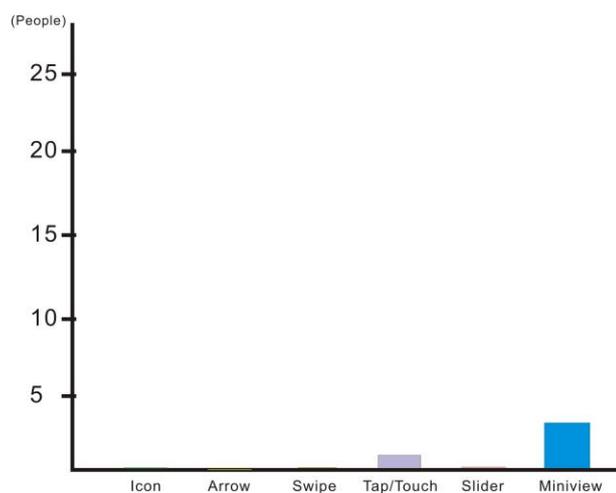


Figure 47: Best approach for Lecturers

As shown in Figure 48, the researcher interviewed two library assistants, and found they

respectively chose Tap/Touch and Page Miniview as the best approach to turn pages. They all thought Tap/Touch was the fastest page-turning methods to turn pages and saved reading time.

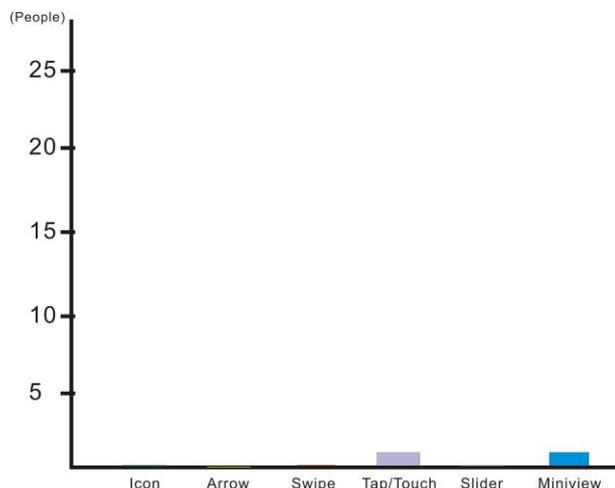


Figure 48: Best approach for Library Assistants

4.6.10 Best approach for different qualifications

In order to analyse and conclude the preference of participants by their qualification for each approach and which one they liked best, the researcher referred to the investigation Part 2 Question 1: Which approach did you like best to turn page? The researcher also analysed the result data from the investigation answers of Question 1.

As shown in Figure 49, most participants who had Bachelors degrees thought Tap/Touch was the best approach, and ten of 16 participants with a Bachelors qualification chose this approach. They thought this approach was fast to turn pages. None of the Bachelors liked Icon and Arrow as the best approach because they thought the Arrow was too small to touch. Two of 16 bachelors liked Swipe because they thought Swipe seemed like a real book. 1 Bachelors thought Slider was the best to turn pages because they thought it was an interesting approach. The other three of 16 Bachelors liked Page Miniview because they thought it was easy to find the page when they scanned the page number on Miniview.

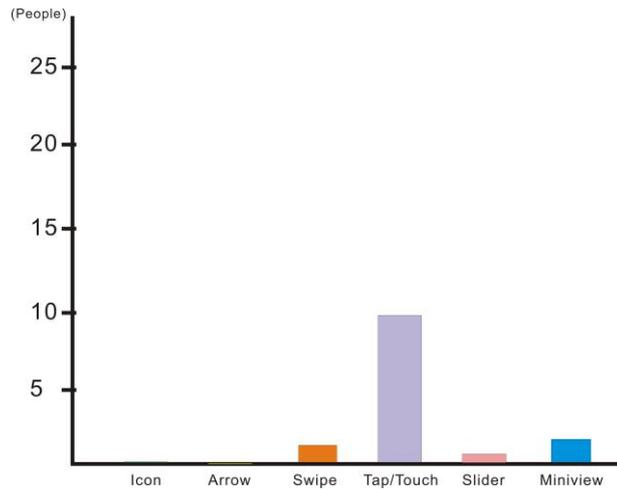


Figure 49: Best approach for Bachelors

As shown in Figure 50, participants with a Masters qualification seemed like a range of approaches. Swipe, Tap/Touch and Miniview were respectively accepted by two of seven Masters. The other one participant with a Masters chose Icon as the best approach to turn pages because this participant thought Icon was accurate to turn pages one by one. None of the Masters chose Arrow and Slider as the best approach to turn pages, they thought Arrow was too similar to Icon but they liked Icon more than Arrow and they were confused by Slider because they did not know how to click a specific position to turn pages.

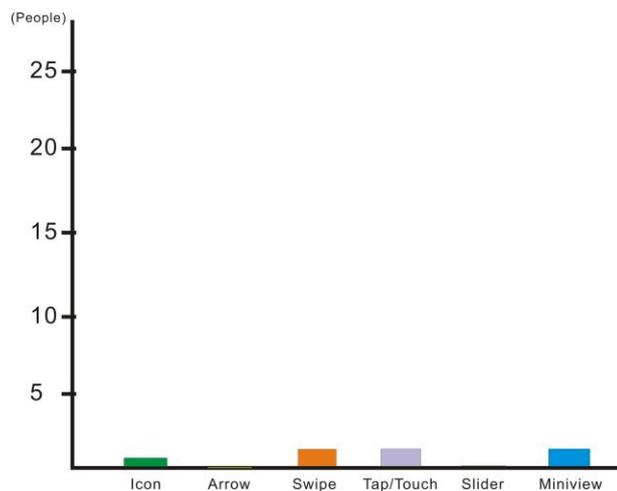


Figure 50: Best approach for Masters

As shown in Figure 51, people who had PhD degrees thought Swipe and Tap/Touch were

the best approaches to turn pages. Two of seven PhDs liked Swipe and another two people chose Tap/Touch. They thought Swipe looked like the real book, and Tap/Touch was fast to turn pages and saved time. Three PhDs chose Page Miniview as the best approach to turn pages because they thought it was clear to know the page number when they scanned the Page Miniview and then they could quickly find they page they wanted to read. None of the PhDs choose Icon, Arrow or Slider because they thought Icon and Arrow were too small to touch; they were similar to each other and difficult to distinguish. They thought Slider was not clear to tell readers to click where to move to a specific page.

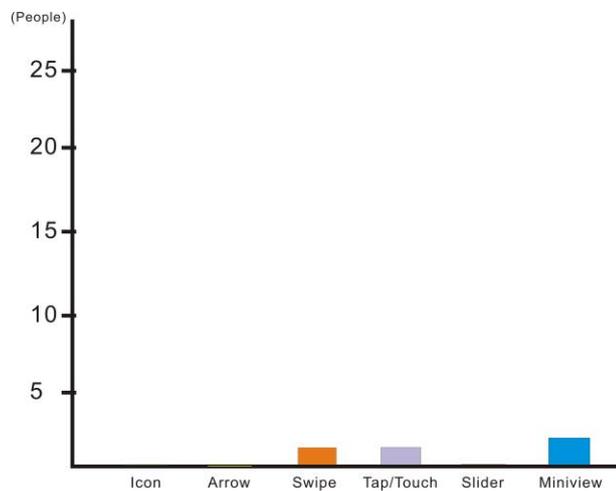


Figure 51: Best approach for PhDs

4.7 Discussion

This section discusses the ease and difficulty of six approaches and preferences of participants for different page-turning methods in eBooks. This section refers to the question RQ2 What interactive features of page turning could affect readers' preference? and RQ3: Is reader preference affected by reader background?

This chapter mainly researched how the preference of participants for page turning methods in eBooks affected participants, this chapter refer to Chapter 2 Section 2.2 and Section 2.3. In these sections of Chapter 2, the researcher collected information about page turning in eBooks, the interactive elements in eBooks and the preference of

participants for eBooks. The researcher devised six page-turning methods and referred to useful interactive elements of page turning methods in Chapter 3. The Chapter 4 researched the effect of different page-turning methods on participants. The researcher analysed the background of participants and found in Chapter Section 2.3, other authors also illustrated that participants' preference related to interactive elements themselves and the background of participants.

In Chapter 2, Section 2.3, authors Carlock, Maughan and Anali et al. (2008) conducted research to elicit feedback on various topics related to eBooks. These authors considered that participants' preference related to their background via investigating how familiar the participants were with eBooks, their attitude to eBooks, and the purpose they use eBooks for. Carlock, Maughan and Anali et al. (2008) considered that if readers were more familiar with downloading eBooks and easily finding references from eBooks, especially readers who used eBooks for academic research, they would be more likely to use eBooks frequently. These authors also stated that interactive features of eBooks, such as interactive points and page turning methods, could play different roles for readers who used eBooks for academic research or pleasure reading. This finding was related to the findings of this thesis in Section 4.6.9, the best approach for different occupations of participants. In this thesis, most participants who were students used eBooks frequently because they were young generation familiar with using technology and the Internet. These students preferred using eBooks because they usually searched for information for their academic research and they could obtain information quickly if they searched for it in eBooks. Older people more commonly read eBooks for pleasure, which was different from the purpose of students. Thus older people preferred a page turning method, which was similar to physical books, such as Swipe. They did not need to turn pages fast; their purpose was enjoying the slow reading experience.

Richardson and Mahmood (2012) said different age of groups had different choices for eBooks and participants' preference also related to interactive elements themselves. These authors considered that the young generation and older people had different preferences

for interactive elements in eBooks. Young people were more likely to choose an eBook with interactive elements, which they could use for different page turning methods, while older people chose eBooks with simple interactive elements, which they could understand easily. This finding was similar to this thesis in Section 4.6.7, best approach for different age groups. Younger participants in this thesis focused on page turning methods, which were fast for turning the page. They also cared different ways they touched the screen to turn the page and the convenience of clicking the different interactive points to turn the page. Older participants in this thesis were more likely to choose Swipe and Page Miniview, because their purpose was to read content clearly and slowly.

Authors Carlock, Maughan and Anali et al. (2008) considered that the difference and connection between eBooks and printed books could be an element that affects participants' preference. These authors also considered that the interactive features that participants would like to get from eBooks before they choose an eBook also could affect their preference. This finding could prove the result of the investigation in Chapter 4 of this thesis, which was that different purposes of reading eBooks could affect readers' preference. Older participants in research in this thesis had a tendency to prefer a page turning method more similar to printed books, while younger participants liked eBooks with page turning methods the helped them to turn the page fast.

Rowlands and Jamali (2010) considered that interactive elements such as icons, fonts and high quality graphics, touch screen navigation and auto-scroll for reading could play a key role in affecting participants' preference. Touch screen navigation was different from auto-scroll for reading. For instance, readers could click different icons to turn the page manually, while auto-scroll was the page turning action automatically happened between a specific time intervals. In the investigation of this thesis, the researcher only investigated participants' preference for turning the page manually with different page turning methods, and found that icons and illustration could affect readers' preference. Different participants had different preferences for using icons to turn the page. Some

older participants who held high-level qualifications preferred Page Miniview to turn the page because the illustration showed the page number clearly, while some younger participants who were students liked to use icons to turn the page because they felt icons were easy to touch. The researcher found participants' preference related to interactive elements in eBooks and participants' background.

In this chapter, participants gave various reasons for their preference for six devised page-turning methods. They assessed the methods based on its page turning speed, the size of interactive points and the ease of utilization. Participants with different backgrounds had different preferences for each page-turning method. In this chapter, the researcher analysed their preference for ease of use for six approaches, their personal preference for these approaches and then concluded the reasons why they chose these page-turning methods as the best approach to turn pages. Participants also chose appropriate approaches they liked for academic and pleasure reading. The researcher found that the preference of participants not only related to the page turning method itself, but also related to participants' background.

4.7.1 Analysis of Factors affecting the preference of participants

Participants hold a variety of opinions about why they prefer different page turning approaches; this not only depended on the perceived ease or difficulty of each approach, but also related to the age, gender, qualification and occupation of participants. It was found that the perceived difficulty of each approach itself also plays a key role in the preference of participants. According to the responses of participants, the research summarized that there are three main factors that affected the preference of participants, which respectively were the speed of turning page, the accuracy of clicking the interactive points, and the accuracy to turn the page. In the investigation, Tap/Touch was most popular approach among participants because it was fast to turn the page. Some participants would like to choose Icon because it is accurate to click those interactive points to turn the page. Page Miniview was considered as the accurate approach to turn the page by participants who liked it, they thought Page Miniview showed the page

number to readers that avoid readers click the wrong page. According to the investigation Part 2 Question 1, one of the participants considered that Icon they like best, the main reason was Icon was easy to click. No participants preferred Arrow. Six of participants preferred Swipe, because it was similar to real book. Three participants liked to use Slider, because it was interesting. Fifteen of participants liked Tap/Touch best, because it was fast to turn pages. Six of participants preferred Page Miniview, because it was easy to preview the page content and page number.

4.7.1.1 Preference for Icon

According to the investigation, in Part 1: How easy did you find using these approaches?, Icon had a large number of “Very easy” or “slightly easy ” responses in Part 1. In Part 2, some participants thought the Icon was small to touch and the gap between Icons was narrow, but it was not hard to understand how to use it. Participants felt it was hard to know which Icon represented which page.

As was shown in Section 4.4, that Icon was considered very easy or slightly easy by the most participants. However, most young participants, especially students, did not prefer this approach, they thought the dot was too small and they also had no idea about finding the specific page they wanted to read. They described the Icon as not clear for finding page information.

4.7.1.2 Preference for Arrow

According to the investigation, in Part 1: How easy did you find using these approaches?, Arrow had a large number of “Very easy” or “slightly easy ” responses in Part 1. Most participants considered Arrow was very easy or slightly easy, this approach was accepted by different age groups, occupations, qualifications and genders. Whether participant’s young or old, all thought this approach was easy to use. They thought it was easy to follow the Arrow direction to turn pages, because these participants told the researcher that they used the similar approach as Arrow in other eBook applications. Arrow was thought to be the most ‘normal’ symbol that people could understand immediately.

In Part 2, participants thought readers could know how to turn to the next page and previous page when they saw the Arrow direction, while some participants described the felt the arrows were hard to click on the right position because their finger was bigger than the Arrows, so it was easy to make a mistake when they used this approach to turn pages.

4.7.1.3 Preference for Swipe

Swipe had a considerable number of 'very easy' and 'not easy or hard' responses in Part 1. In Part 2, Swipe was accepted by most participants because it gave readers a feeling of it being just like reading a real book. Participants considered this approach was easy, due to the fact that they were familiar with page turning of physical books, some of them liked this approach because it seemed like a real book while others thought this approach was interesting. The researcher found that most participants who liked this approach were older people and people who had a PhD qualification. They were patient enough to wait for a slow page turning animation and enjoy this slow process; the researcher considered that this might be because they often read deeply and slowly, so Swipe was suitable for them. A large proportion of participants considered that Swipe was more appropriate for pleasure reading. Swipe was described as feeling like a real book because the page turning animation was accurate. Most participants thought this approach was easy to turn pages, due to the fact that they could Swipe the screen to turn pages one by one. Thus, readers did not worry about missing any pages. Older people and females especially liked this approach because they enjoyed the slow reading process and had more patience to wait for the page turning animation.

4.7.1.4 Preference for Tap/Touch

The researcher concluded that Tap/Touch was the most popular approach amongst all participants, participants thought this approach was easy to use and understand, and they did not need to focus on one specific position to turn pages. Tap/Touch had the greatest number of 'very easy' responses in Part 1, and in Part 2 it was also the 'best', the 'easiest', and highly accurate, ranked second after Page Miniview. Tap/Touch was also

chosen as the most appropriate approach for academic and pleasure reading by a large proportion of participants. Almost all participants thought this approach was very easy to use. Especially young people (age between 18-25), they thought this approach was fast for turning pages and they did not need to waste time turning pages while reading. Most older people thought this approach was not bad, but they did not like this approach best. There were several older people who gave the researcher a suggestion that it would be better if the Tap/Touch page turning speed was slower. Participants explained that if they are reading an interesting eBook and they could not wait to read more, turning the page very fast was considered important for them. There were 14 of 30 participants who thought Tap/Touch was the easiest for turning pages, and nine of them were between 18 to 25 years and students. The researcher concluded that the younger generation preferred the fast speed for turning pages; they could not wait when they read materials.

4.7.1.5 Preference for Slider

Most participants thought Slider was hard to use to turn pages in Part 1, a large number of participants thought Slider was 'very hard', because participants considered it was hard to know a certain position to click on the Slider to skip to a specific page they wanted to read. In Part 2, there were few participants who thought Slider was easy to use, most participants considered this approach was not clear and convenient for page turning. Older people (over 46 years old) considered that it was hard to jump pages and find the specific position. Most participants who were students thought this approach was not suitable for academic reading, because they thought it was hard to find the page quickly. Participants considered they could click anywhere on the Slider to turn pages, but they totally had no idea where they needed to click if they wanted to jump to a specific page.

4.1.7.6 Preference for Page Miniview

Page Miniview was also very popular among participants, especially people who were over 35 years old. Page Miniview had a considerable number of 'very easy' and 'slightly easy' responses in Part 1, they described this approach as easy to understand and clear.

Older people liked this approach because they thought it was easy to find the page they wanted to read when they scanned the Miniview, they could know the page number and find it quickly. In Part 2, participants who chose Page Miniview as the best approach and most accurate approach did so because they thought they could scan the page overview and page number in Miniview, it was very useful for finding the specific information quickly and the page they wanted to read. Page Miniview was considered as the most accurate approach to turning pages. They could preview the page content and page number, which decreased the probability of touching the wrong position to turn pages. People who had Masters and PhD degrees preferred this approach, because they liked everything to be clear, it was helpful for their academic research. There were nine of 30 participants thought Page Miniview was the most accurate, and 13 of 30 participants thought it was most intuitive to turn pages, there were three participants though Page Miniview was both accurate and intuitive. Eleven of them were between 18 to 25 years old. Eight of participants are over 25 years old. The possible reason for this result was that young people liked the approach that was intuitive and they could understand quickly. The researcher concluded that Page Miniview was acceptable by most age groups. Older adults liked this approach because they thought it was easy to find the specific page they want to read, they scanned the Miniview and to search the page numbers quickly.

4.7.2 The preference of participants for academic and pleasure reading

According to the investigation Part 2, 21 participants read e-article both for academic information and pleasure reading, and most of them are students. Seven participants only read academic e-article, the researcher found that these participants were students and most of them need to read academic information for their study. Two participants only read e-articles for pleasure; they were older people or age over 35 years old. The possible reason was that older people had more time to read eBook for pleasure. Nine participants never read e-articles for pleasure, most of these participants were students, and these participants said that they needed to write essay and study for exams, so no

time for pleasure reading. Page Miniview was the approach that most participants consider was more appropriate for academic information reading. The main reason was that readers could scan the page numbers in Miniview, it saved time for finding information quickly.

4.7.3 The reason for preference of different age group

According to the Section 4.6.7, the researcher found that most young people (under the age of 25) preferred the Tap/Touch approach to turn pages, and almost all of them described this approach as fast for turning pages. The researcher concluded that young people like the fast speed to turn pages because they were perhaps a little more impatient. However, older people (over the age of 45) preferred Page Miniview because they like to scan the page overview and page number; they considered this approach was very clear for guiding readers on how to turn pages. The researcher found that older people preferred the approach, which they could understand well, and to them the page turning speed did not matter.

Participants who liked the Swipe approach did so because they felt like they were reading a real book when they turned pages; they thought the page turning animation was similar to a physical book and most of them were over 46 years old. The researcher concluded that older people are more familiar with page turning of physical books than eBooks. Most participants thought the Slider was confusing whether they were young or old, because they found it hard to touch the specific position to skip to the page they wanted to read. The researcher found most young people liked Tap/Touch approach because it was fast to turn the page. Older people were more likely to choose a page turning method, which was easy to understand. Almost all participants thought Icon and Arrow were too small to touch, and the gap was also too narrow, but participants considered these two approaches were easier to understand. The researcher considered the Arrow to be a distinctive symbol that most people know how to use it, so participants could understand this approach quickly.

4.7.4 The reason for preference of different genders

According to the Section 4.6.8, Tap/Touch was the most popular approach across the two genders. A large proportion of females and males chose Tap/Touch as the best approach for turning pages. Males especially preferred Tap/Touch to females. The researcher considered that Tap/Touch was fast to turn pages, and that could be accepted by both genders.

Very few participants chose Icon as the best approach, and none of the participants chose Arrow as the best approach. The only participant who chose Icon as the best approach to turning pages was female. According to the responses of both genders, they thought Icon and Arrow were not difficult to use, but these two approaches were also not their first choice for turning pages. Especially males thought Icon and Arrow were too small to touch and the gap between them was narrow.

The proportion of males who chose Swipe as the best approach was larger than the females who chose Swipe. As discussed in the first paragraph of this section, the males preferred Tap/Touch to females because they liked to turn page fast. In this paragraph, more males preferred Swipe than females, however, Swipe was slow for turning pages, and this finding is interesting. The researcher thought the possible reason was the number of male participants was not large enough compared to females.

There were few participants chose Slider as the best approach, only one female and one male liked this approach. According to the responses of participants, the researcher thought Slider was not very clear for either gender regarding where they should touch to turn to a specific position.

There were few males and females who chose Page Miniview, only four females and two males, but the number was bigger than Slider. Females and males who chose Page Miniview both thought it was convenient to see the page number when they scanned the Miniviews.

4.7.5 The reason for preference of different occupations and qualifications

According to the Section 4.6.9 and 4.6.10, there were 24 students who participated in this study and most of them chose Tap/Touch as the best approach for turning pages. The researcher considered that students often read academic articles and search for information. Tap/Touch was fast for turning pages and saved time. Most students were still studying Bachelors.

There were four Lecturers in this investigation and two of them held Masters qualifications, the other two lecturers held PhD qualifications. The researcher also interviewed two Library Assistants and both of them held PhD qualifications. All of these non-student participants seemed were likely to chose Page Miniview and Swipe than other page-turning methods. The researcher considered because they frequently research academic topics, so they need to find information accurately. Thus, reading articles carefully and slowly was important for them. The researcher also found an interesting thing was that this group was also more likely to read for pleasure than students were.

4.8 Conclusion

In this investigation, the preference of readers not only related to the eBooks themselves, but also related to participants' backgrounds. Different age groups of participants have different preferences for page turning, the preference also related to different occupations, qualifications and genders. In Chapter 2 (see Section 2.3), Leverkus and Acedo (2013) considered that different age groups had different tastes for various types of books; this range is very large and complicated, it included novel, documentary, history, fiction and non-fiction. Richardson and Mahmood (2012) considered that in order to know the eBook features that readers preferred, it was necessary to know the background of participants. They also stated that young people had a trend to read more eBooks than printed books.

The features of eBooks themselves also played a key role in affecting readers' preference. The interactive elements, such as the devised six page-turning methods in Chapter 4,

could affect readers when they read. Readers might find the eBook was easy to read if they liked these interactive elements. The different way of touching the screen to turn pages was vital for affecting readers' preference. For instance, in the investigation of this research, the participants read the same article, but they gave different responses when they used six page-turning methods. To click the screen to turn pages or swiping the screen to turn pages could engender different result of preference of participants. Participants might give different judgment for a same article if they used different way to touch the screen to turn pages. In Chapter 4, readers had different preferences for the devised page-turning methods, older people who held higher qualifications and females liked approaches, which were slower for turning pages, and they liked approaches, which could navigate them to find the page they want to read clearly. Young people and males liked approaches to page turning that were fast. Interactive points and speed of page turning were two vital elements in eBooks, which seemed to affect readers a lot.

4.8.1 Answering RQ2

RQ2 What interactive features of page turning could affect readers' preference?

To find those interactive elements in eBooks that affected readers' preference the researcher devised six page-turning methods based on the findings of the case study reported in Chapter 3. When the six page-turning methods were tested, it was clear that Tap/Touch was most often preferred for turning pages by 50% of participants. Least preferred was Arrow. Therefore interactive features of page turning do affect readers' preferences.

4.8.2 Answering RQ3

RQ3 Is reader preference affected by reader background?

This chapter begins to investigate if preference for eBook page-turning is influenced by reader background such as gender, age, occupation and qualification. Different readers had different preferences and attitudes to each page-turning method; young students

were more like to choose a page-turning method, which was fast to turn pages, such as Tap/Touch. Young participants preferred a page turning method that could help them find the information quickly. Older people who held Master or PhD qualifications preferred Page Miniview and Swipe rather than other page-turning methods, because they liked to read eBook slowly and deeply. The researcher concluded that the preference of readers was affected by readers' background.

Chapter Five – Conclusion

This chapter summarizes and concludes the results of this research. The researcher provides suggestions for designing an eBook based on the results of this research.

5.1 Introduction

The purpose of this thesis was to research how the different interface elements for page turning in eBooks affect the preference of readers. The researcher collected participants' data, and developed conclusions on the vital factors that affect preference of participants. The thesis includes 3 important sections. The first section is the literature review (see Chapter 2), this section collects related information about page turning of eBooks and the possible interactive elements, which are useful for this research. The second section is the case study (see Chapter 3). In this section, some existing eBook applications were chosen to be research objects. The researcher compared these different eBook applications on three devices, which are Android system, iOS system and Kindle. This section was designed to investigate the interactive elements in common eBook applications, in order to give a clue for the third and final section (see Chapter 4) – a page turn preference study. In this final section (see Chapter 4), the researcher interviewed 30 participants for their preference of six eBook page turning approaches, and analysed the reasons for these preferences.

5.2 Summary

This thesis identified and tested six different page turning approaches, and considered the preferences of users with different age groups, genders, occupations and qualifications for these approaches. The six approaches that were identified and tested were Icon, Arrow, Swipe, Tap/Touch, Slider and Page Miniview.

In Chapter 2, the thesis analysed the related work by introducing the existing interactive elements in eBooks that affect readers. The researcher analysed the evolution of eBooks,

the interactive methods used in eBooks and elements that affect different age groups. It was found that different interactive elements of page turning could effect readers, such as the shape of Icons and different ways of page turning. Marshall and Bly (2005) specifically address the hypothesis of this thesis and suggest that visual elements play a key role for navigating readers. For example Marshall and Bly (2005) stated that different page-turning methods could give readers different reading experiences. They reported that interface elements could influence readers' preference and their attitude to eBooks the current features of page turning in eBooks. Page turning animation and motion graphics in eBook could also play a key role in the preference of readers. The different ways of clicking the screen to turn pages also engender different effects on readers' preferences. For example, clicking a point to turn a page compared to swiping the screen to turn page will give readers a different experience. The position of page turning elements is also important, different positions for elements could engender different results. It has been shown by Marshall (2010) that readers have a tendency for clicking a convenient position on the screen to turn pages.

It was also found that users' expectations from eBooks are inherited from their experience with paper books. The reason is paper books increase users' subjective satisfaction (Chong, Lim, & Ling, 2009). Chong, Lim and Ling (2009) stated that some parts of eBooks simulate physical books, some designers tend to research new ways of page turning, such as scrolling up and down, page turn right or left; these ways are quite similar to page turning in physical books. This point illustrated that readers who chose the Swipe page turning method as the best approach to turn the page in Chapter 4 Investigation. Participants who chose Swipe as the best approach to turn the page did so because they felt Swipe was similar to a real book. These users also stated that they liked the feeling of swiping the screen to turn pages. They also liked Swipe because they thought the animation of page turning in Swipe method was interesting, it made them feel like holding real papers in hands.

Finally it was identified in the literature that readers' preference was likely related to the

background of the reader. Richardson and Mahmood (2012) said different age groups had different preference of eBooks when they read or choosing an eBook.

In Chapter 3, the researcher investigated common eBook reading applications in three systems (iOS, Android and Kindle). The researcher collected and analysed common page-turning methods in applications on these systems, such as dragging the Slider to turn the page, swiping the screen to turn the page and clicking the interactive points to turn pages. These current approaches would be used in the chapters that followed to help the researcher to devise her own application for page-turning. In the case study, the researcher identified that the different interactive points and page turning methods would likely influence the preference of readers. It was hypothesized that the same content in different applications and different page turning approaches could engender different preferences for page-turning by readers.

In Chapter 4, the researcher provided an investigation of user behaviour when participants used six different approaches of page turning in eBooks. The researcher devised an experimental tool for users to interact with and an interview to find the user preferences for page-turning methods in eBooks. The six approaches investigated in Chapter 4 were Icon, Arrow, Swipe, Slider, Tap/Touch and Page Miniview. The researcher investigated participants' preference for ease, intuitiveness and accuracy of the six approaches, and asked them which approach they considered to be the best approach to turn the page.

5.3 Answers to research questions

This section summarises the answers to three research questions, RQ1 to RQ3.

5.3.1 What are the current norms for page turning in digital books? (RQ1)

In Chapter 2, through the literature review some current norms for page turning in digital books were identified and reported. The researcher found that the interactive points and different way of touching the screen to turn pages were some of the interactive

elements for page turning in digital books that have been investigated in the literature. This chapter did not completely reveal the answers to RQ1 and thus a case study was initiated.

In Chapter 3 of this thesis a case study revealed that there are a number of interactive elements present in eBooks. These elements were interactive points such as Icon, Arrow, Slider, Page Miniview for page turning method. Besides the Icon, Arrow, Slider and Page Miniview, interactive elements in page-turning methods also include the way of touching the screen, such as Swipe and Tap/Touch.

5.3.2 What interactive features of page turning could affect readers' preference? (RQ2)

The Chapter 4 investigation of participant preferences demonstrated that interactive elements in page turning such as Icon, Arrow, Slider and Page Miniview could affect the experience of readers. The different way of touching the screen, such as a static touch in one place on a specific Icon, compared to a Swipe action to turn the page could also play a key role in affecting preference of readers. The gap between Icons and Arrows, the size of interactive points could affect reader's reading experience. Participants liked the wide gap between interactive points and they also liked the suitable size of Icon and Arrow, which was appropriately sized for their fingers. This was important to the readers as it helped them avoid touching the wrong place when they clicked the interactive points to turn pages. Some participants liked to Tap/Touch the screen because they thought this approach was easy and convenient. They thought they only needed to touch the right side or left side of the screen to turn pages, not click the specific point to turn pages. Some participants liked Swipe because they liked the experience of Swipe the screen, which seemed like a real book. There were fewer participants who liked the Slider method because it was hard to understand how to touch a position to move to a specific page. Some participants liked to click Icons or Arrows because they thought Icons and Arrows were more accurate to turn pages, they could turn pages one by one which avoided them missing something. Some participants liked Page Miniview to turn pages because they

thought it was clear to see the page number of Miniview, which helped them find the page they want to read quickly.

5.3.3 Is reader preference affected by reader background? (RQ3)

To answer this question, the researcher interviewed participants of different age, gender, qualification and occupation. In Chapter 4, the analysis of this investigation demonstrated that different age groups liked different page-turning methods. Young adults liked methods which were fast to turn pages, older people and people who held PhD qualifications liked page Swipe and Miniview methods, they liked methods which were more clear and easy to understand. Females and males both liked Tap/Touch, both genders thought Tap/Touch was easy to use and understand; they could touch anywhere to turn pages.

5.4 Limitations of the study

The researcher was only able to interview 30 participants in the short timeframe of a graduate investigation and thus generalizable results may be limited. A larger sample could be collected for future studies. Future studies should progress this investigation beyond that of academic reading to include participants outside of a university context. Including various occupations of participants from the community may also prove valuable.

The pace of changing technology may render results out of date quickly and thus further investigation may be necessary.

The researcher did not investigate a wide range of e-Ink devices, or desktop computing devices, instead she only reviewed tablet devices (in Chapter 3), and these eBook applications were only downloaded in iOS system, Android system and Kindle tablet. A comparative study with these other reading device types may be useful to provide further insights. The researcher suggests that in future studies page-turning methods should be tested in various devices, such as computer, laptop and mobile phone. This

may reveal readers experience across multiple platforms and form factors for digital reading and page turning.

The study only researched six existing page-turning approaches. In the future studies, it would be useful to devise new or novel page-turning methods, which may never have been used in eBooks. Testing only novel methods may alleviate the influence of people's previous impression for similar page-turning methods.

5.5 Findings and conclusion

In this thesis, the main purpose was to research the preference of participants for six different page-turning methods (Icon, Arrow, Swipe, Tap/Touch, Slider and Page Miniview). The researcher found that different age groups had different preferences, and Tap/Touch was the most acceptable approach among participants of all age groups. The Chapter 2 literature review mainly illustrated interactive elements in eBook and the effect of these features on readers, which including page turning methods, interactive points and other features (such as cover, typography and illustration). The Chapter 3 mainly compared common features and differences in existing eBook applications in three devices. The Chapter 4 mainly investigated the preference of readers for six devised page turning methods. The Chapter 5 concluded the features of each devised page turning method in Chapter 4 and compared them with page turning methods in Chapter 3, in order to find out the features that could affect readers. The researcher also concluded the background of readers could be an element that affect their preference for eBooks.

The researcher found the common features of current eBook reading applications was the Tap/Touch approach. In Chapter 4, participants who liked Tap/Touch gave similar reasons why they liked this approach. Most participants who preferred Tap/Touch thought it was convenient to turn the page and the page turning speed was considered fast. They considered this approach also easy to use and understand, they could touch the screen without hesitation and they did not waste time thinking about clicking on a specific position to turn the page.

The devised approach of Swipe for the investigation in Chapter 4 was similar to Swipe in different applications in Chapter 3, most participants thought the devised Swipe method in Chapter 4 has a slow page turn, but 1 participant who liked this approach described the page-turning animation as amazing. Participants who liked this approach thought they enjoyed the slow reading process and liked to watch the page turning animation.

The Icons identified in the different applications reviewed in Chapter 3 were a little different from those devised for the Icon approach in Chapter 4, participants thought the devised Icon was too small to touch and the gap between Icons was too narrow.

The function of Arrows in Chapter 3 was for turning pages one by one; the devised approach of Arrows for Chapter 4 was similar. Arrows used in the interface tested in Chapter 4 were for turning the page one by one. Participants thought the Arrow method was easy to understand, but the size of the Arrows was too small.

The Slider in different applications in Chapter 3 was draggable; readers could drag the Slider to turn the page. In the devised approach of Sliders in Chapter 4, participants could only click different positions on the Slider to turn the page, and they thought if the devised Slider could drag it would have been better.

The feature of Page Miniview in different applications in Chapter 3 was different from the devised Page Miniview approach in Chapter 4. The Miniviews in Chapter 3 were all the same size, and without page numbers. In Chapter 4, the devised Page Miniview method had page number on each Miniview, the researcher considered that participants might more preferred devised Page Miniview in Chapter 4 than Page Miniview in Chapter 3, because the Page Miniview in Chapter 4 was easier to find a specific page if readers follow the page number on Miniviews. In Chapter 4, participants also liked the page number on the Miniviews; it helped them find pages quickly.

The younger participants (18-35 years old) preferred the Tap/Touch approach, they considered page-turning speed is important for them. The participants who were over 45 years old preferred Page Miniview, because they liked the clear page number on

Miniview, it helped them find the page they wanted to read fast, and saved time. Tap/Touch was overall the most popular approach among participants of all ages. There were only a few participants who liked the Slider; most participants thought this approach was annoying, because they did not know how to touch the specific position to turn to a certain page they wanted. Most participants thought Icon and Arrow were good, but they were too small, and the gap between dots and Arrows was too narrow.

Most participants were familiar with eBooks and knew what page turning was, and most of them preferred the Tap/Touch approach because it was fast to turn pages. Some participants still chose Swipe as the best page turning method because they thought Swipe was similar to a real book, they still liked the feeling of reading a real book. The researcher also found that most participants liked the approach, which they could understand immediately, or they had previously known in other eBook applications they had used.

5.6 Advice for the design of eBooks

Based on the results of the research performed for this thesis, the researcher summarises here some advice for publishers and designers based on the evidence of testing of six page turning approaches for eBooks. The Swipe approach was shown to be better for pleasure reading, for example if readers want to read novels or entertainment articles, Swipe could give readers a relaxing experience. The Page Miniview was helpful for academic information reading, because readers could find the pages they want quickly when they scan the Miniview. If readers want to read a continuous text and do not want to miss any pages and information, Tap/Touch may be the best choice, the page turning speed is fast and readers could touch anywhere on either side of the screen to turn pages one by one forwards or backwards. With these different page-turning features providing different advantages in different reading situations, perhaps it would be useful to provide users more than one page turning method to choose from in a single eBook application.

The feedback provided by participants also allows some insight into design considerations. According to some participants, a fast page turning speed is necessary for reading eBooks, because it would save time when reading. Also, the gap between interactive points should fit the general finger size of most people. In the investigation, some participants considered it was important to have an introduction or navigation at the start of an eBook, in order to help people understand the novel use of the eBook quickly. The researcher also found that most participants thought it was important to help users to identify the specific position they need to touch if they wanted to turn a specific page. The advantage of Page Miniview was it had page number on the Miniviews, which helped people to know and find the specific page quickly. This page turning method was the best choice for people who liked to find information quickly.

There are some vital elements for designing a successful eBook; the speed of page turning, the intuitiveness of page numbering and the suitable size of interactive elements that all play key roles in an eBook. The designer should ensure the page turning speed is appropriate for most age groups, not too fast and not too slow, the speed should be appropriate for both younger people and older people. There also should be a navigation or introduction for readers when they open an eBook, the navigation should tell readers how to find the specific page they want and how to turn pages, it should help readers to understand the page turning approach in an eBook reading application as quickly as possible. In this research, many participants thought the gap between the elements in the Arrows and Icons interfaces were too narrow, and these interactive points were also too small for their fingers.

5.7 Future work

In this section, the researcher proposes suggestions for future research for page-turning in eBooks. It would be useful to investigate page-turning methods in different types of eBooks to investigate whether the preferences of participants could be affected by elements other than the page-turning methods themselves. The future work should

specifically evaluate the points as below:

1. Devising as many page turning approaches as possible to investigate, it would also be better to investigate more participants. Increased numbers of participants might illicit more generalizable results.
2. It is necessary to investigate different background people from society, not only from the university.
3. The study should not only interview people who know eBooks and have qualifications, but also interview people who never studied at universities and have no knowledge about eBook page turning.
4. Future studies could focus on specific investigations of reading for pleasure and specific investigation of reading for academic purposes.
5. Investigation of age groups outside this current investigation, for example school children and various age levels and aged population who have very different cognitive, motor and vision needs.

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Appendix

Material for observation study

This appendix contains all related material for the observation user study reported in this thesis.

- Ethical Approval Letter from the Human Research Ethics Committee of the Faculty of Computing and Mathematical Sciences at the University of Waikato, dated 18 October 2016;
- Research Consent Form, which outline the details of proposed activity;
- Participant information and consent form, which outlines the study goals and procedure as well as the participant's right;
- Interview form, which includes questions of investigation for participants;

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Te Whare Wānanga o Waikato

18 October 2016

Jiao Huang
C/- Department of Computer Science
THE UNIVERSITY OF WAIKATO

Dear Jiao

Application for approval under the Ethical Conduct in Human Research and Related Activities Regulations

I have considered your application for a research project involving human participants entitled "How do different interface elements for page turning search in eBooks affect readers preference."

The procedure described in your request is acceptable. Participants involved in the study will not be identified in any resulting publications. At the conclusion of the project the data will be submitted to the FCMS Data Archive repository.

The Participant Information Sheet, Consent Form and Questionnaire comply with the requirements of the University's Human Research Ethics policies and procedures.

I therefore approve your application to perform the research project.

Yours sincerely



Mark Apperley
Human Research Ethics Committee
Faculty of Computing and Mathematical Sciences

Figure 52: Ethics Consent Form

<p>Participant Information Sheet Research Consent Form</p>		 <p>THE UNIVERSITY OF WAIKATO <i>Te Whare Wānanga o Waikato</i></p>
<p>Ethics Committee, Faculty of Computing and Mathematical Sciences</p>		
<p>Project Title How do different interface elements for page turning in eBooks affect readers' preference?</p>		
<p>Purpose This research is conducted as partial requirement for <i>Master of Computer Graphic Design (MCGD)</i>. This project requires the researcher to choose a topic and conduct research on the topic through using surveys or interviews or a combination of the two techniques.</p>		
<p>What is this research project about? This research is to investigate participants' preference and attitude for page turning in eBooks. There are many ways of page turning, readers can turn the page via swiping the screen from one side to the other side, tap or touch the screen, drag the slider at the bottom of the screen, or scan the page miniview. There are also many interactive elements such as icon, arrow and illustration that can affect readers' preference. This investigation is to discover how the different approaches of page turning search affect readers' preference.</p>		
<p>What will you have to do and how long will it take? The participants will be given a mobile device on which to read several portions of an eBook each with a different method to turn pages. Participants will be shown each approach of page turning via a short animation which is a part of the test software being used on the researchers tablet device. Once the participant has experienced all page turning methods they will be asked to indicate which approach they find preferable for turning the page during a short interview. The interview may be audio recorded. You will be asked to give consent prior to the interview.</p>		
<p>What will happen to the information collected? The information collected will be used by the researcher to write a research report for the credit of a her MCGD. It is possible that articles and presentations may be the outcome of the research. Only the researcher <i>and supervisor</i> will be privy to the notes, documents, recordings. When the research is completed they will be stored in the FCMS Data Archive for 5 years. Afterwards, notes, documents will be destroyed and recordings erased. The researcher will keep transcriptions of the recordings but will treat them with the strictest confidentiality. No participants will be named in the publications and every effort will be made to disguise their identity.</p>		
<p>Declaration to participants If you take part in the study, you have the right to:</p> <ul style="list-style-type: none"> • Refuse to answer any particular question, and to withdraw from the study before analysis has commenced on the data. • Ask any further questions about the study that occurs to you during your participation. • Be given access to a summary of findings from the study when it is concluded. 		
<p>Who's responsible? If you have any questions or concerns about the project, either now or in the future, please feel free to contact either:</p>		
<p>Researcher Huang Jiao (Jill) Huangjiao831@hotmail.com 0211813541</p>	<p>Supervisor Claire Timpany ctimpany@waikato.ac.nz 07 838 4309</p>	<p>Supervisor Nic Vanderschantz vtwoz@waikato.ac.nz 07 838 4309</p>

Figure 53: Participant Information Sheet

Ethics Committee, Faculty of Computing and Mathematical Sciences

How do different interface elements for page turning search in eBooks affect readers' preference

Consent Form for Participants

I have read the **Participant Information Sheet** for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study before data analysis has begun, or to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researchers under the conditions of confidentiality set out on the **Participant Information Sheet**.

I agree to participate in this study under the conditions set out in the **Participant Information Sheet**.

Signed: _____

Name: _____

Date: _____

Additional Consent as Required

I agree / do not agree to my responses to be audio recorded.

Signed: _____

Name: _____

Date: _____

Researcher's Name and contact information:

Researcher	Supervisor	Supervisor
Huang Jiao (Jill)	Claire Timpany	Nic Vanderschantz
Huangjiao831@hotmail.com	ctimpany@waikato.ac.nz	vtwoz@waikato.ac.nz
0211813541	07 838 4309	07 838 4309

Figure 54: Participant Consent Form



THE UNIVERSITY OF
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Te Whare Wānanga o Waikato

Research Interview Form

Participant ID Number:
Age:
Gender:
Academic Qualification:
Occupation:

How easy did you find using:

Icon	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Arrow	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Swipe	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Tap/Touch	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Slider	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					
Miniview	Very Easy	Slightly Easy	Neither Easy or Hard	Slightly Hard	Very Hard
Why					

Figure 55: Research Interview Form. Page 1

9. Do you read e-article for academic information reading?

10. How often?
Times per week
Times per month
Times per year

11. Do you read e-article for pleasure reading?

12. How often?
Times per week
Times per month
Times per year

13. Do you think one of these approaches is more appropriate for academic information reading?

14. Why?

15. Do you think one of these approaches is more appropriate for pleasure reading?

16. Why?

Figure 57: Research Information Form. Page 3

17. Is there anything else about turning pages when reading that you would like to discuss?

Figure 58: Research Information Form. Page 4