HDK

Reading Partner:

Enjoy the reading and explore more

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Abstract

Reading is the access to information and knowledge. But the value of reading is far beyond the knowledge obtained. Reading delights people and contributes to the self-development. Although we have different opinions about reading books, the wishes of having a happy and inspiring reading is the ideal. In fact, people are changing their reading habits according to the fast-paced and information-rich society. How to keep people reading books and make use of technology to benefit reading is what this design project aims to.

This report discusses people's attitude in reading books and the fact of reading e-books, compares the differences of traditional reading and e-reading, and defines reading activities as well as what a pen scanner can do to contribute to reading activities. The problem is how we adjust our traditional reading to a modern lifestyle with the requirement of customizing our reading material for personal use.

The design is mainly for students, scholars and people who often read for study and research. The solution is a pen scanner which scans, stores, searches and tags text and pictures in books. The purpose of this project is to find a way to help people to read books and enjoy it in the context of information and internet society, as well as to promote reading as positive means to satisfy people's spiritual needs and encourage self-development.

Sammanfattning

Att läsa ger tillgång till kunskap. Värdet av att läsa sträcker sig dock långt bortom den kunskap man erhåller. Människor njuter av att läsa och det bidrar till självkunskap och utveckling. Det finns olika uppfattningar om att läsa böcker, så är det ideala att ha en njutbar och inspirerande läsning. Läsvanorna håller på att ändras på grund av det "hektiska" och informationsrika samhälle vi lever i idag. Projektet syftar till att "förädla" traditionell läsning med modern teknik.

Denna rapport tar upp folks attityd till att läsa vanliga böcker och e-böcker, jämför traditionellt med nytt, definierar aktiviteter i samband med dessa liksom vad en pennskanner kan bidra med för att förhöja läsprocessens kvalité. Problemet är hur vi anpassar vårt traditionella sätt att läsa till en modern livsstil med behovet av att finna det bästa som passar just "Dig".

Detta designförslag är i första hand utformat med studenter, lärare och forskare i åtanke. Resultatet är en pennskanner som skannar, lagrar, söker och märker text och bilder i böcker. Ändamålet är att finna en lösning där nytta och glädje tillförs bokläsaren ur ett IT-perspektiv, lika mycket som att uppmuntra själva läsningen då den har en positiv verkan på människors självutveckling.

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1 Background

Although development in digital technology influences the reading habit a lot, the value of reading books appears to be more precious. People read for different reasons, acquiring information and knowledge or enjoying stories. Nowadays people are more used to read on a screen with internet, as it contains so much information and provides easy access. It is also convenient to interact with the contents by, for instance, leaving messages to exchange thoughts and opinions. On the contrary, reading books requires a calm mood and plenty of time. People are stressed and lack of patience in the daily life.

The weakness of reading online is obvious since information are scattered and sometimes lack of authority; and the way to locate information distract the concentration and contemplation which are important skills in the learning process. Furthermore, a recent research report from Anne Mangen in Norway[1] indicates that the physical manipulations we have to do with a computer while reading, not related to the reading itself, disturb our mental appreciation. While reading a book, the physical substance of a book and surroundings offer tranquility. I also agree with Anne's opinion that we understand more and better when reading on paper than when we read the same text on a screen; we avoid navigating and the small things we don't think about, but which subconsciously takes attention away from the reading.

As Trond Egil Toft[2] wrote: "The most important difference is when the text becomes digital. Then it loses its physical dimension, which is special to the book, and the reader loses his feeling of totality." People who have grown up with books as the main reading medium consider this to provide the true reading experience. People who share this opinion upon reading experience by showing relevant photographs in Flicr.com appreciate reading as "a basic tool in the living of a good life", "the enlightenment of soul", "a barrier between me and the world, heightens, comforts and calms my emotion depending on my need." Books as both physical contact and spirit nourishment indeed help readers to understand themselves better and keep a healthy life style.

1.1 People's attitude in reading books

Fewer and fewer men read books according to the research from Survey on Living Condition which was conducted by Statistic Sweden in 2007[3]. In the figure 1.1, about 28% of men aged 16-84 read books every week, 42% of them read now and then, and 30% of them never read during year2004-2005. In figure 1.2, about 47% of women aged 16-84 read books every week, 40% of them read now and then, and 16% of them never

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[1] Trond Egil Toft, 2008, why don't we read so well on a screen. The Reading Centre, University of Stavanger

[2] Trond Egil Toft, 2008, why don't we read so well on a screen. The Reading Centre, University of Stavanger

[3] Survey on Living Conditions: fewer and fewer men read books, Statistic Sweden, 2/7/2007, http://www.scb.se/

read. Although fewer men read books compared to women, it is hard to say that fewer and fewer people read books in general, and it is difficult to predict if fewer people will read books in the future.

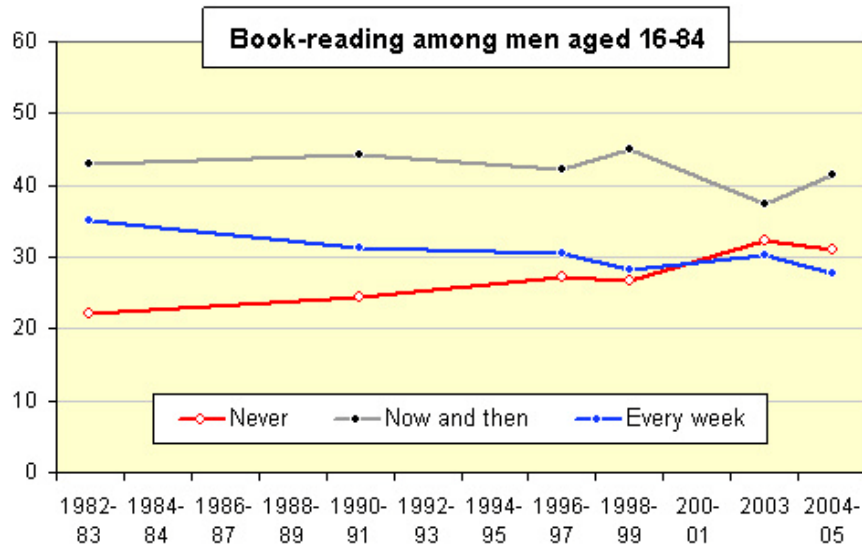Diagram 1 - Book-reading among men aged 16-84 years, 1980-2005. Percent

Figure 1.1

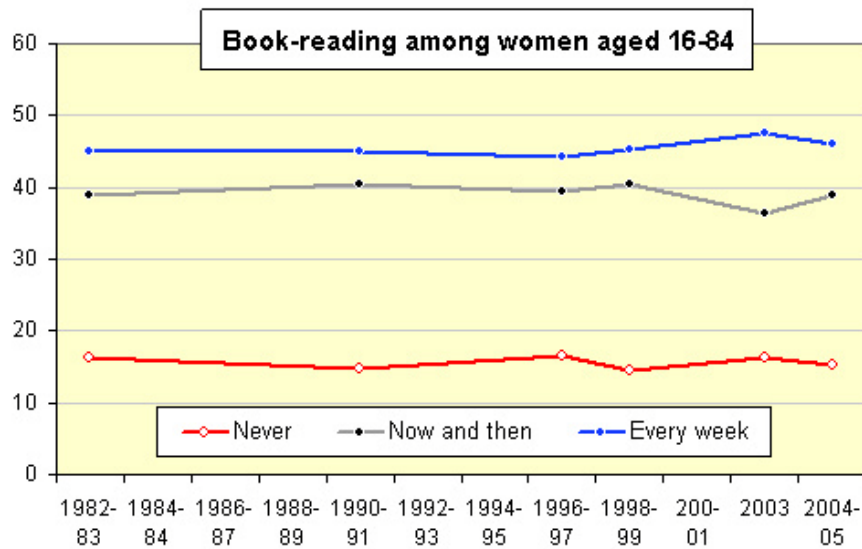Diagram 2 - Book-reading among women aged 16-84 years, 1980-2005.Percent

Figure 1.2

In my opinion, people in general still have a positive attitude towards reading books. We grow up with books as we get information, educate ourselves or entertain ourselves by reading books. It is something that nothing could replace completely. Although people start to shift their focus to other media like internet, e-reader or something else, the elder generation would have the will to read and the younger generation would be taught to read by their parents. Reading books is such an activity that we could pass it on and on, as long as we have books and would like to share knowledge and stories.

Adult

A research about reading and buying habits from Book Marketing Ltd (BML) and Arts Council England in 2005 indicated that there are a third of adults interviewed that claim that they don't really read books recently at all. But three out of four had enjoyed reading books sometime earlier in their lives, when they were children or adult[4].The reason for those non-readers who had read books for pleasure to stop reading is mostly because they are too occupied with work, children and social life. Besides, prefer doing something more relaxing is one main reason as well. The research also indicated that most people interviewed were positive towards reading and many could foresee themselves reading in the future[5]. They would like to start reading again or read more, if they have more leisure time or enjoy reading more. Furthermore, a lot of people agreed that reading benefit people's life as it is a good way of gaining new knowledge/perspectives and an enjoyable way of relaxing.[6] This makes it believable that current readers will keep on reading and non-readers would like to pick up books again.

Young people

Most young people's attitudes towards reading are generally positive, found in the research conducted by Mori in 2003. The result is based on 914 self-completion questionnaires completed by 11-18 year olds across England and Wales[7]. The majority of young people find reading is not only an enjoyable activity but also an educational approach. Young people try new hobbies and learn new things by reading books. They are more aware of their working preference and understand different peoples and cultures better, etc. Although 43% of respondents agreed that the internet and computers will have replaced the printed media in a near future, 83% of them read books in their spare time[8]. They will want to read if it is recommended by their friends, teachers and parents, as well as having more free time.[9] Other media, like TV and film trigger them to read in some occasion.

Another research held by National Literacy Trust in 2005 suggests that young people's reading is rich and diverse. 1512 pupils aged from 5 to 17 from three primary, one middle and two secondary schools in England participated. They have very positive

[4] BML, Expanding the Book Market: A study of reading and buying habits in GB, 2005,p33
[5] BML, Expanding the Book Market: A study of reading and buying habits in GB, ,2005,p35
[6] BML, Expanding the Book Market: A study of reading and buying habits in GB, 2005,p37
[7] The Nestlé Family Monitor, Young people's attitudes towards reading, No.17, November 2003,p22
[8] The Nestlé Family Monitor, Young people's attitudes towards reading, No.17, November 2003,p7
[9] The Nestlé Family Monitor, Young people's attitudes towards reading, No.17, November 2003,p13

attitude towards reading and having a will to read more. Some key findings are mentioned:

1. Half the sample enjoyed reading either very much or quite a lot and rated themselves as proficient readers.
2. The majority of pupils indicated reading every day or once/twice a week.

Pupils generally held positive attitudes towards reading- agreeing with statements that reading is important and disagreeing with statements that reading is boring, hard, or for girls rather than boys.

3. Pupils indicated reading a diverse range of materials outside class, which included texts other than books. When asked specifically about fiction preferences, adventure, comedy and horror/ghost stories were the most frequently chosen types.
4. When asked why they were reading, most pupils indicated that they read because it is a skill for life, it helps them find out what they want/need to know and because it is fun. Only a fifth of pupils read because they have to.
5. Pupils indicated that they would read more if they had more time, if they enjoyed it more, if books were cheaper and if books were about subjects they were interested in.[10]

Though the research data is between 2003 and 2005, people's attitude of reading doesn't change much. Reading is considered an important activity and lifelong skill which benefit people's life by both adults and young people. Lacking of time and motivation is the barrier for people reading more books. But things can be done to promote reading, since people still have the will to read.

1.2 E-reading

The invention of e-ink (electronic ink) has the great potential to develop the way of reading. According to Wikipedia, e-ink is a type of electronic paper manufactured by E Ink Corporation, founded in 1997 based on research started at the MIT Media Lab. E-Paper made of e-ink is the main material of e-reader which is not backlit. It resembles printed paper under nature light and it does not glare when we read it under direct sunlight. E-reader becomes the most popular application of e-ink technology. It is usually designed as a book-sized portable device which can download and store a library of books. The market is usually for people who would love carry a lot of books around and perhaps read cheaper.

Kindle, the e-reader

Amazon's Kindle, is promoted as a convenient, portable reading device with the ability to wirelessly download books, blogs, magazines and newspapers. The Kindle products use E Ink brand electronic paper displays, and are able to download content over Amazon Whispernet using the Sprint EVDO network. The Whispernet is accessible without any fee, which allows the users free access to the internet. In 2009, Amazon launched the Kindle

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[10] Christina Clark and Amelia Foster, children's and young people's reading habits and preferences: The who, what, why, where and when, National Literacy Trust, December 2005, p17

application for iPhone and iPod that users can read the content from their Kindle device. The new Kindle DX was released May 2009. (Figure 1.3) (Supplement 7.1) It has improved several design details, such as larger screen and better-placed buttons. It is for better displaying newspaper and textbook content[11].

The new Kindle DX has improved to provide better reading experience. It provides a black-and white 9.7-inch diagonal screen with no glare and backlight. It can be read in portrait or landscape mode, and allow readers to adjust the font sizes. Every book in Kindle owners' private library can be large printed. With built-in dictionary, it allows readers to look up definition of a new word which will automatically display at the bottom of the screen when moving the cursor to it. Readers can easily type in annotations which can be edited later on. The 5-way controller is for highlighting and clipping key passages and bookmarking pages for future use. The Kindle DX also remembers the last pages and will open to the page once open the book again. With its Text-to-Speech feature, Kindle DX can read the contents out loud with turning pages automatically when it is being read. It also can play MP3 files which can be background music during the reading.

Figure 1.3

Reading e-books is not the only thing we can do with Kindle DX. Amazon is trying to deliver extra service to make the Kindle a multi-functional device. For instance, users can subscribe newspaper with Kindle. With a single click, users can clip and save entire articles for later reading. Each Kindle has a unique and customizable e-mail address. This allows the approved contacts to e-mail Word, PDF documents and pictures wirelessly to Kindle for a small fee or for free. Its basic Web browser works well to read simple, text-centric Web sites, such as Google and Wikipedia. Users can also search references within a book, across personal Kindle library, in the Kindle Store, or the Web by typing in a word or phrase.

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[11] Brad Stone, Looking to Big-Screen e-Readers to Help Save the Daily Press, New York Times, May 3, 2009

Competition of e-readers

Travel companion and business profession

Since Amazon Kindle has opened a market of e-reader in the late 2007, it has been almost synonymous with e-readers. The first two Kindle products resemble the image of paperback, and it is designed to carry thousands of books around, for leisure. The Kindle DX has larger screen as it is claimed to display newspaper and textbooks better. The e-reader with the largest screen in e-reader industry from Plastic Logic aims at business reading. Therefore, users can not only read through pages, but also read across documents. Besides, its touch screen makes it much easier to add annotations on documents.

Resembling reading books

The tactile experience of reading books and the way that people handle books hardly make any reading device replace books. Even the producers of e-readers admit that books are so good that they disappear when people read them[12]. Jeff Bezos, the CEO of Amazon.com believes that a book-reading device must project an aura of bookishness and appear less of a whizzy gizmo. Therefore the Kindle has the dimensions of a paperback, with a tapering of its width that emulates the bulge toward a book's binding[13]. E-ink technology makes reading interface almost as natural as texts on paper. But the technology now doesn't support color display, and the transition from page to page is not that smooth. Sony Reader Touch edition allows users to swipe their finger to flip pages that simulate the tactile experience of reading books. The flexible plastic display from Plastic Logic further shapes the landscape of the e-reading industrial that e-readers would be as natural as books in a material manner.

Reading service

Amazon doesn't only sell devices, but also digital books. Users can purchase e-books in Amazon's on-line bookstore from the Kindle devices where there are up to over 350,000 books. They have free wireless access to the online store which benefits the Kindle readers a lot. The beginning of a book can be downloaded as the sample of the book for free, and then users can buy them by one click and download them in a minute. Amazon released an application for Apple's iPhone and iPod Touch, so that users who simply don't want to have an additional device or have no wish to pay hundreds of dollars for a Kindle can download any book from Kindle's online store straight to their handheld.

Amazon stressed that its main goal was to make reading more convenient for Kindle users. Although there are doubt that the Kindle application may give consumers less incentive to buy a kindle from the start, Amazon views kindle for other devices as a complement[14]. Unlike Amazon Kindle, Sony aims to expand the e-book reader market by offering customers more choice than Amazon. Not only books from Sony's e-book store, but also millions of free public domain books from Google books search projects.(Supplement 7.2) Even though free books appeals to the Sony Readers a lot, the lack of wireless ability

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[12] Nicholson Baker, A new page---Can the Kindle really improve on the book? The New Yorker, August 3,2009
[13] Steven Levy, The Future of Reading, Newsweek, Nov 26,2007
[14] Douglas MacMillan, Amazon's Apple Deal: Kindle Cannibal? BusinessWeek internet

makes the current Sony reader fighting hard against Amazon Kindle. Unlike Kindle users, who can download books to their device wherever they are, Sony Reader users must plug the reader into their computers. As Sony's latest Reader Daily Edition having free wireless connection with its e- book store shows[15], wireless network and easy access to any books are the main trend of e-readers.

Beyond ordinary books

Jeff Bezos, the CEO of Amazon intended to make Kindle do what books can't do. The Kindles allow users to change font size and look up words with built-in dictionary, as well as let them make annotations, highlight key passages and bookmark pages for further use. The audio book and Read-to-Me Feature enhance users reading experience. The wireless connection makes the Kindle works independently so that users have no restraint to go to online bookstore, browse for books, check out personal recommendations, read reader reviews and post new ones. Thanks to the wireless connection, Kindle works as a basic web browser that can help users to look up things in Wikipedia, search via Google and follow links on blogs. Unlike Kindles, Sony Reader have a touch screen where users can adjust font sizes, look up words in built-in dictionary, highlight key passage and make annotations, by swiping and tapping their fingers on the screen. The explosive success of the iPhone and successive multipurpose handhelds lead the trend that e-reader is on the way to become the iPod of reading[16].

Reading application in cell phone

There are many ways to read freely wherever you are, as people could read with their smartphone while they are waiting for a bus, on a bus, waiting for a queue, before going to bed or awake in the middle of the night. In order to make reading convenient anywhere, again, Amazon has released Kindle application for iPhone and iPod so that users can read e-books from their Kindle library with their handheld. The other free application called Stanza gives users access to Stanza's own bookshop, which offers more than 100,000 titles, and about half of them are free. The iTunes store provides audio books and App Store Books section which benefit the users as well. Free application, easy download and cheap prices of e-books for cell phone make the reading so convenient for Smartphone users. Some book publishers view the mobile-book as a way to attract new readers, e.g. those who don't walk to a bookstore or go to online bookstore. The market has great potential, as Analysts estimate that fewer than 1 million e-readers were sold since the devices were introduced, but 36.5 million smartphones which are capable of carrying e-books were sold, in the third quarter of 2008 alone, according to Gartner[17,18].

On the other hand, authors can use e-book software maker to create free mobile version of their works, and promote them through branded or freely downloadable e-books. It

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[15] www.sonystyle.com

[16] Steven Levy, The Future of Reading, NewsWeek, Nov 26,2007

[17] Olga Kharif, Move Over Kindle; E-books hit cell phones,Businessweek, December 30, 2008

[18] Gartner, Inc. provides independent and objective research and analysis on information technology (IT), computer hardware, software, communications, and related technology industries .www.investing.businessweek.com

provides an easy but different way to authors to be discovered, which excites readers as well.

1.3 Books or e-book?

Books are such a traditional media that people get used to and appreciate it a lot. Every book is unique as the cover and the typeface, the color and the texture of paper etc., are distinct from one another. The way of handling them, shelving them, the smell and the feel of them make people believe those paperbacks probably are the best design for readers. It is believed by many people that the tactile printed media is more flexible as it is portable and sharable, while digital books contained in an e-reader are restrained in the plastic box, both the physical form and the contents.

A company, Portigal Consulting[19], has collected some interesting opinions from the field research of "reading ahead". There are six participants who are active readers in reading books or e-books involved (three are ordinary readers, three are Kindle readers). The synthesis about books and reading comes from their reading behavior and opinions. Books are unique objects to people as the contents they are carrying and the design makes every single book different. People handle them differently with personal preferences. They do more than carry contents[20]. Books engage the senses. They become carriers of specific memories, a symbol of an event, interaction and relationship. As objects, books can be well designed as art pieces, the first edition can be very valuable to be collected. Books have strong connection with personal identity as others can see a piece of you by looking at what you read. Books can create physical record of someone's reading activity, for instance, lining up books in a certain order to get a sense of accomplishment or adding annotations, bookmarks and tags to track ones' personal history.

For many Kindle users, they like Kindle as much as they like books, as Kindle does facilitate the need of mobile reading. For People who love reading, they are bound up with their love with books, because it does give more experience than an e-reader. In the main finding from the field research of "reading ahead", most participants have more positive attitude in books than e-books. As it mentioned, for Erica, the Kindle signifies "computer", so it does not let her "unplug" from the fast-paced connected lifestyle. Several people described the kinetics of page-turning as an important aspect of reading books that is absent in the Kindle. Most of all, Books offer ways of navigating content that a Kindle does not: flipping, comparing non-sequential pages, looking at the recipes at the end of each chapter[21].

Books are almost the perfect design for the way it works. Because they are simple and easy to handle, flexible and durable and instant on-off.

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[19] http://www.portigal.com/
[20] Dan Soltzberg, <u>Reading Ahead: Topline Summary</u>, Aug. 10th,2009, http://www.portigal.com/
[21] Dan Soltzberg, <u>Reading Ahead: Topline Summary</u>, Aug. 10th,2009, http://www.portigal.com/

By reading Kindle users comments on internet, I noticed some people still prefer reading books after having a try-out of e-reader. Most of them complain about the high price of the device, the issue of battery life, the availability of accessing books they want, the rigid feeling of user interface, and the other limitation as most digital gadgets would have.

1.4 Reading activity

Inspiring activity

The fantastic thing about reading is that it influences people in a good way. It makes people more relaxed that they become more active in thoughts and sensitive in feeling. The enjoyment of reading is not only about enjoying a calm mood, but also enjoying reading as an inspiring and encouraging activity. People are publishing reading reviews and recommending books on internet, the activities related to reading become one part of reading experience.

Interactive activity

As Catherine C. Marshall from Microsoft Corporation admitted, the concept of reading is considered being a material activity involving physical artifacts that afford certain kinds of feedback and experience[22]. Reading is not a still status, but an activity that interacts between readers and books or among readers. The interaction happens all along with the reading procedure. It could mean flipping pages to sense the paper while the finger movement indicating certain emotion or the level of accomplishment. In fact, the interaction with books not only happens during reading, but also before opening a book and after finishing it.

The book reading experience can be evaluated in several phases. According to the synthesis from the field research "reading ahead", the complete experience includes **pre-reading** which is connected with memories or aspiration about stories or knowledge, **reading** which associates with tactile and kinesthetic aspects and **post-reading** which is mostly relevant to social perspective, such as recommending and sharing. Relatively, when reading goes to digital, the e- reader tries to offer as much as possible by simulating
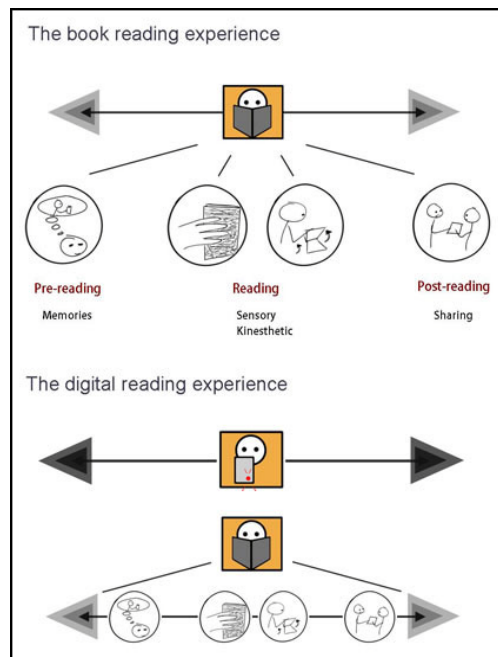

Figure 1.4

[22] Marshall, C.C. 2005, Reading and Interactivity in the Digital Library: Creating an Experience that Transcends Paper. Digital Library Development: The View from Kanazawa, (Deanna Marcum and Gerald George, eds.) Westport, Connecticut: Libraries Unlimited

reading books that readers could refer to book reading experience. (Figure 1.4)

Reading has a significant social aspect. In post-reading phase, books can be recommended, and discussed with friends and family. Books can be passed to next generation, and a story can be read to children by their parents. Books can be shared and contents can be spread and studied together. On the contrary, the e-reader users own their e-books privately so they can't share them, but they can write comments and search items on internet.

The sense of books, the gesture of turning pages, adding bookmark as a way to trace personal history, are all considered as interactive activities in reading which make personal reading experience vivid and unique. Similarly, e-reader users can make digital annotation and add virtual bookmarks. The possibilities to browse internet with e-readers can make interaction as active as one can do with any personal computer. For Kindle, readers can browse on it, buy books with it, make annotation on it, and search on it. It seems as it aims to cover all activities related to reading in one single device.

What a pen scanner can do?

People read mainly for work or for fun. They are two different modes which influence which book is going to be read, and the readers' mood. People use tools to custom their reading. For instance, reading for work is usually private and requires focus, about learning and solving problems, so that references and tools to make notes or organize the material would be in need.

Concerning reading activities, such as looking up a word and making notes, there are products to replace hefty dictionaries, pens and notebooks. I consider pen scanners are one of those products that can make reading experience a bit different. A pen scanner is a handheld device with embedded Optical Character Recognition (OCR) engine that the scanned text can be editable for further use (Figure 1.5). As it is

Figure 1.5

small and portable, users can take them to school, office and library. Pen scanners are aimed to help reading and transmit printed texts from paper to computer. There are two basic models, one provides digital dictionaries which helps to make reading more fluently with instant scan-look up or translation function. The other one scans and stores printed texts which can be transferred to word processing programs in a computer instantly or later.

C Pen from C Technologies AB and Quicktionary series from WIZCOM are main pen scanner products in Swedish market. (Supplement 7.2) They are models of translation, digital dictionaries and texts transferring. But there are other models that can recognize

barcode, like IRISPEN Executive 6. Some can scan A4 color pages in both black and white and in color with high resolution, like DocuPen from Planon. The function setting is based on different marketing strategy, as some models are better for taking and storing information than benefiting reading.

2 Identified problems

2.1 Problem formulation

The changing reading habit
We can't say fewer and fewer people read books, but we do notice there are changes in people's life. People spend more and more time in front of computers, doing work or having fun. Reading requires concentration, therefore People choose to do something else instead of reading books after work, like meeting friends, watching TV or playing games. But we still see the possibility to get them back to reading, since most people see the benefit from reading and feel like reading again when they have more time. Newspaper, magazines and blogs on internet are main popular reading material for most people nowadays. It makes people feel more casual and satisfied by reading them .They are short and effective about facts and opinions, questions and answers, and are easier to read without impressing you much as a book may do. The changing reading habit of people is that people read more on other media than books, especially computer screen. But the fact is people don't really read on screen. They tend to scan web pages, and look for keywords that catch their eyes. Because reading on computer screen is tiring and each page has to compete with hundreds of millions of other pages for the users' attention, and again life is busy, people don't have the time to read any more than necessary[23]. We could understand it based on our own experience that this is not what we call reading, but merely getting information. If people are getting used to scanning texts and try to save some time, then how could they manage to enjoy a much slower book reading process? If people are used to dig information and like to jump around to be hyperlinked, how can reading books satisfy their impulse to click an item in the reference list on the last page with their fingers?

The view about the future of reading
Then we talk about the future of reading. If books are almost the perfect design as it is, why are we imagining reading differently? There are possibilities driven by techniques to match our reading experience with modern lifestyle. The benefit of reading on Kindle is that you almost can do everything related to reading with this single device. You buy books from it, you read on it and you customize the pages on it (adjust fonts and orientation), you add bookmarks and annotations on it, and you read newspaper and magazines that you subscribe with it. Most of all, it carries a lot of books. It indicates certain features of how future reading could look like, the interactive aspect and capability beyond a paperback. There are some interesting ideas about how people would like the future reading to be, discussed by the field research "Reading ahead".

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[23] Jakob Nielsen, Alertbox column, "How Users Read on the Web", October 1997, www.useit.com.

The participants would like more interactive, such as putting oneself in the story and choose from alternate versions, as well as retaining the book form while adding functionality, such as merging of book and device, with a cover, and page-turning yet without fixed content, or books that contains hyperlinks, electronic annotations, and multimedia[24.] A concept design competition called "the future of reading" based on Portigal Consulting's initiative has announced the winning proposal which is about sharing reading in a living room with contents floating on the wall[25.] This indicates more about the trend of future reading which is interaction with natural gesture and maintaining the book form. It also points out that people expect something beyond books as tranquil objects, such as reading in a social perspective and be given possibilities to develop activities. Is digitalizing reading the only solution? What about many of us who love books and really enjoy them and consider reading books as real reading? Is there a way to keep people reading books, as well as making use of technology to benefit reading?

2.2 Purpose and goal

Reading with ability of interaction
People's opinions about books and e-readers indicate that there are issues between what a book can offer and what people expect toned with modern technology and lifestyle. Although we could see a trend according to the emergent new reading media, like smart phones and e-readers, books still play a very important role. People do enjoy the content more and learn better by reading books. After all, it takes time for new medium become perfect and accepted by most people**. The purpose of this project is to find a solution for traditional reading in the modern context so that people could enjoy reading books, as well as developing related activities, by creating interaction between books and readers, and among readers.**

The goal: A companion
Reading is a relatively quiet activity, but it is more active and creative than we thought. During reading, a reader may need a dictionary to look a word up, write down a few sentences on her notebook or mark pages with colorful tags. An e-reader user may also experience similar things to satisfy his specific need, like adding digital annotation and searching other books mentioned in the references, etc. People can achieve a better understanding of the contents with their activities during the reading. Meanwhile, they identify themselves by what they achieved.

The goal is to make a handy tool to refresh traditional reading with digital approach. A tool that is able to inspire readers to be engaged in reading and relevant activities. It can be used while reading, as well as after reading. It scans and stores texts which can be for further use. It has built-in dictionaries and translator which could help reading more fluently. It has access to internet to enable readers to search resources related to

[24] Dan Soltzberg, <u>Reading Ahead: Topline Summary</u>, Aug. 10th,2009, http://www.portigal.com/
[25] Core77, Announcing the winners! 1 hour design challenge: the future of digital reading, Nov.2nd

the book being read from internet, as well as link relevant contents in one book or among books. This allows readers to compare non- sequential pages, or study among different books. Readers are able to review their reading history on it, as well as on the computer which it can be connected with to store activities and texts.

The principle of the design is that it doesn't disturb reading. It must be nice to hold, easy to handle and navigate. The appearance must be clean and gentle which provoke a calm and pleasant mood. The design is mainly for people who enjoy reading books and having a need to work with contents, topics. It is for people who love to read to discover and explore.

3   Result/solution

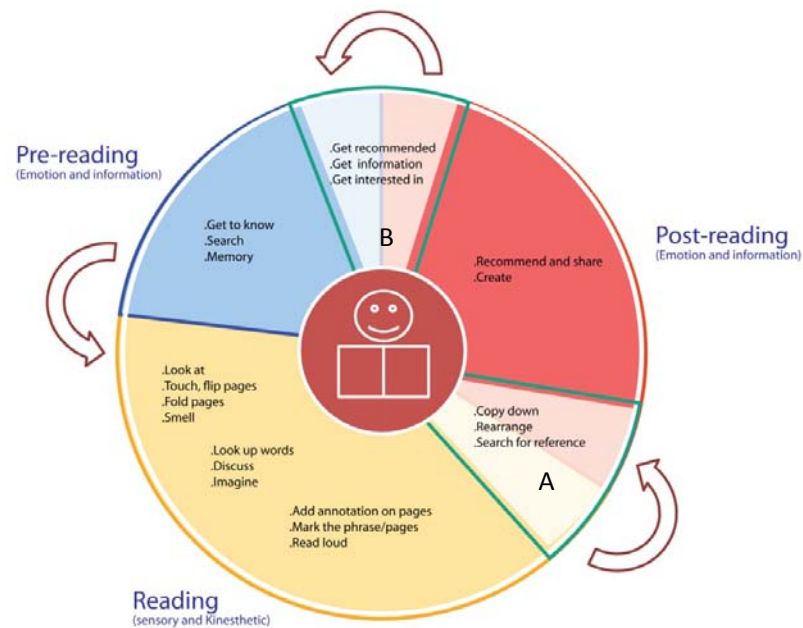### 3.1 The schematic model of reading activity

Figure 3.1

Readers interact with books, although activities such as looking up words or searching for references don't appear as natural as one part of reading. Therefore readers might skip them or do it later, but the fact is that a recognized word and the background material could help better understanding.

This is a schematic model (Figure 3.1) of how reading activities are distributed according to previous study. There are common area A between reading and post-reading, B between post-reading and pre-reading. In area A, there are activities that a book reader might do during reading or after reading, such as copy the texts down and rearrange the texts for further use and search for reference. In area B, there are activities which prepare readers for further reading and relative activities, such as readers get

recommended from others or a reference list of a book just been read. E-readers are trying to integrate activities with reading itself, to benefit digital reading by offering built-in dictionaries and basic web search function, which e-reader users consider promising for future reading.

The problem is the near future of reading books. Therefore, the solution is focusing on how to adjust traditional reading, the form of paper and books, with the need of getting and sharing information, self-learning and working in a modern lifestyle.

3.2 The concept

The design is mainly for students, scholars and people who often read for study and research. Reading activities become natural and necessary, and readers have higher requirement of dealing content and references.

The solution is inspired by both what a pen scanner and e-reader can do, as a pen scanner have initiative contact with paper and content, and an e-reader has an approach to internet and all kinds of resources that enable people to know and learn. The concept is based on existed technology and the possibility of manufacture.

The result is a pen scanner, the "Reading Partner". It can scan printed text, store it, search information wirelessly, and be connected with computer for editing. It is mainly designed to integrate activities with reading books in a natural way. With this product, while reading a book, readers can scan and store texts and pictures in the memory, select words and phrases for definition or translation, compare non-sequential pages and pages from different books, mark and sort scanned texts with digital tags for better management, search for resources on internet with Google Search, Google Book Search and Wikipedia, and clip and sort texts from internet with digital tags. Readers can review scanned texts and pictures according to titles, scanned time and digital tags. With physical connection, it can connect with a personal computer where Scanned texts and pictures can be transferred and sorted according to titles, scanned time and digital tags. Texts and pictures can be edited with normal word and picture processor programs.

3.3 The product

Form
A good tool is an extension of human limbs. Thus, a handheld tool is intimate with people. The size, volume, color, material and the surface treatment are all important in the ergonomic manner. If size and volume affect the comfort, the nice surface may touch the user's emotion. This tool should look reliable, strong but soft, inviting and lovely. The form should be designed for a better grip and easier control.

A pebble looks soft because its round organic shape and it can be hold firmly in hand as a solid. (Figure 3.2) Being inspired by pebbles, the form of "Reading Partner" has round and smooth edge lines which express the quality of soft and firm. It is designed as a highlighter with relatively wide head and body, because the gesture of scanning

Figure 3.2

text is similar to mark text with a highlighter. The form aims to give an impression of simplicity and reliability, with the form and the surface finish. A clay sketch model was made to test the idea. (Figure 3.3)

It is designed not to disturb reading or distract the attention of readers. Therefore, it should be easy to use. With OLED touch screen, readers can easily navigate the scanned texts by sliding and tapping their fingers. Readers can adjust font size by clicking the square button at the side. (Figure 3.4) Three buttons beside the screen are shortcut keys for function "Dictionary", "Search online" and "Review". (Figure3.5) Users may press the buttons with their thumb when they hold it in one hand. Combining the shortcut keys with slide-select function, readers can select a word instantly when they are scanning a passage, or insert a passage from internet with hyperlink while reviewing the texts.

With the sensor at the bottom, users may scan a picture or larger piece of texts by sweeping it over the page to cover the target area. The built-in program stitches every overlap edge into a complete image. (Figure 3.6)(Refer to supplement 7.3)
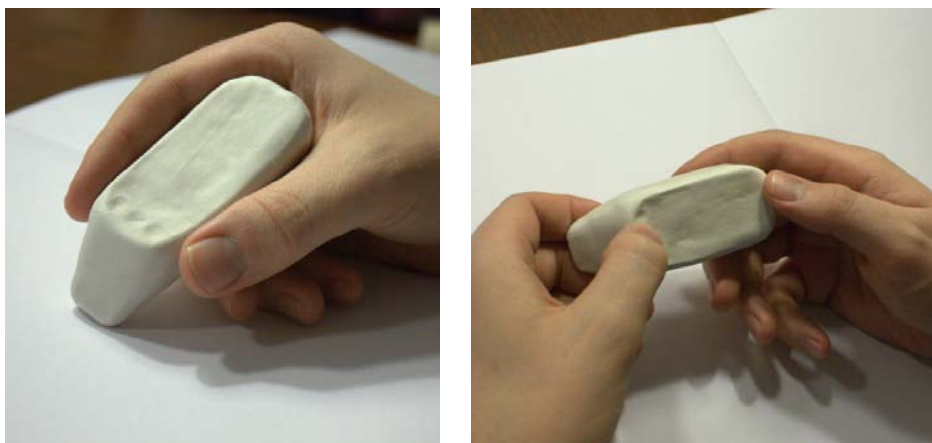

Figure 3.3

Square button

Figure 3.4

Figure 3.5

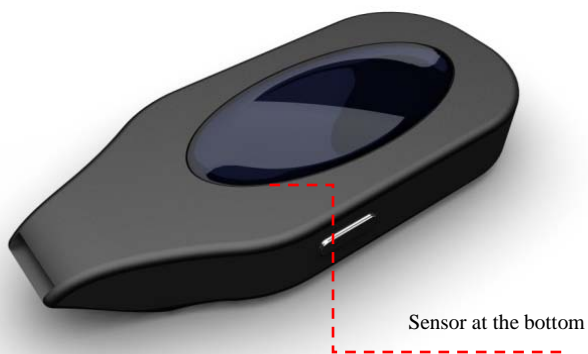Review   Search online   Dictionary

Sensor at the bottom

Figure 3.6

Details

The volume of the pen scanner is about 108mm*46mm*16.5mm. The actual size of the screen is about 56.6mm*31.3mm. It resembles a normal cell phone, but with simpler interface. There are mainly three parts included, upper part, middle part and lower part. The upper part contains a shell in dark grey with matte and soft finish, OLED[26] touch screen, three shortcut key buttons, indicating light and touch panel with five colored tags on it. (Figure 3.7) The middle part contains a side shell in metallic silver, with a power switch and font size adjustable button. The lower part contains a shell in dark grey with matte and soft finish as well, and a scanner sensor at the bottom to capture pictures, or larger area of texts. (Figure 3.8)
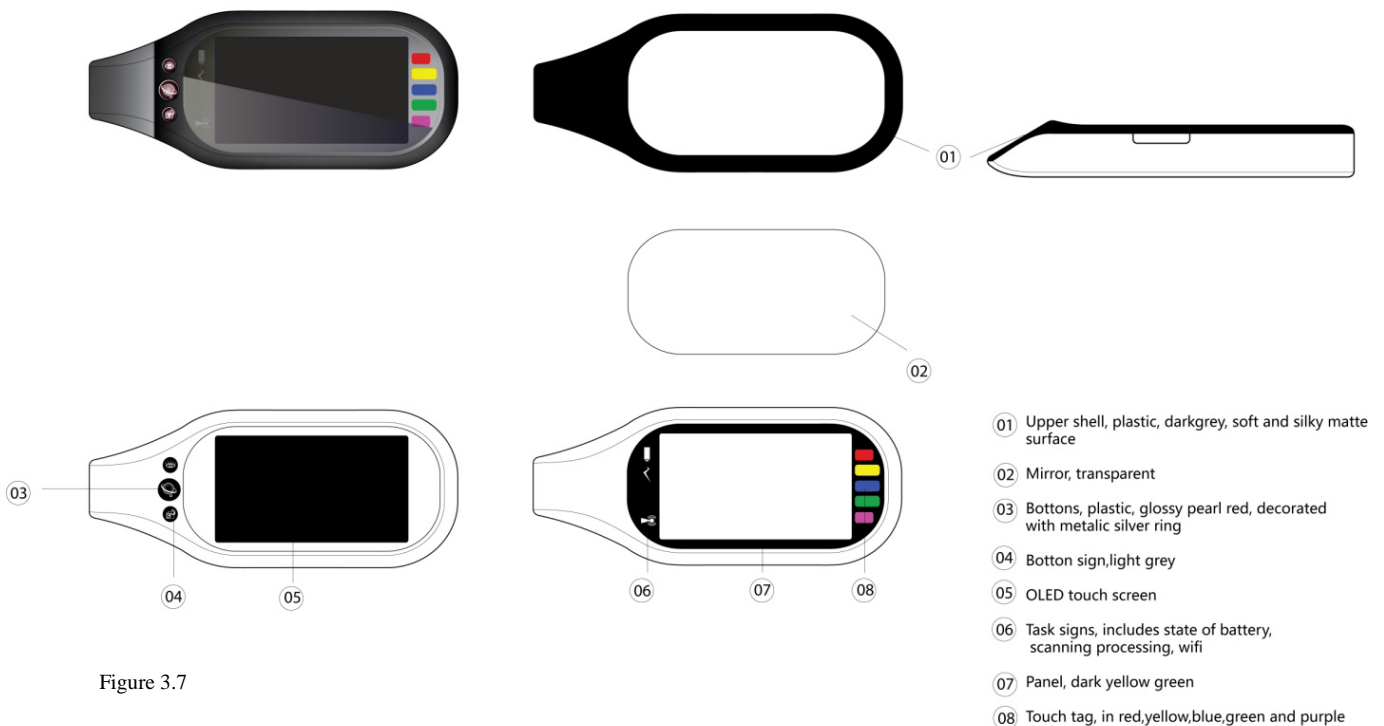
01 Upper shell, plastic, darkgrey, soft and silky matte surface

02 Mirror, transparent

03 Bottons, plastic, glossy pearl red, decorated with metalic silver ring

04 Botton sign,light grey

05 OLED touch screen

06 Task signs, includes state of battery, scanning processing, wifi

07 Panel, dark yellow green

08 Touch tag, in red,yellow,blue,green and purple

Figure 3.7

Figure 3.8

09   Scanner head at the bottom

10   Lower shell, plastic, dark grey,
      soft and silky matte surface

11   Side shell, plastic, metalic silver,
      matte finish

12   Button for adjusting font size, glossy silver

13   Plug for SD card slot,rubber, dark red
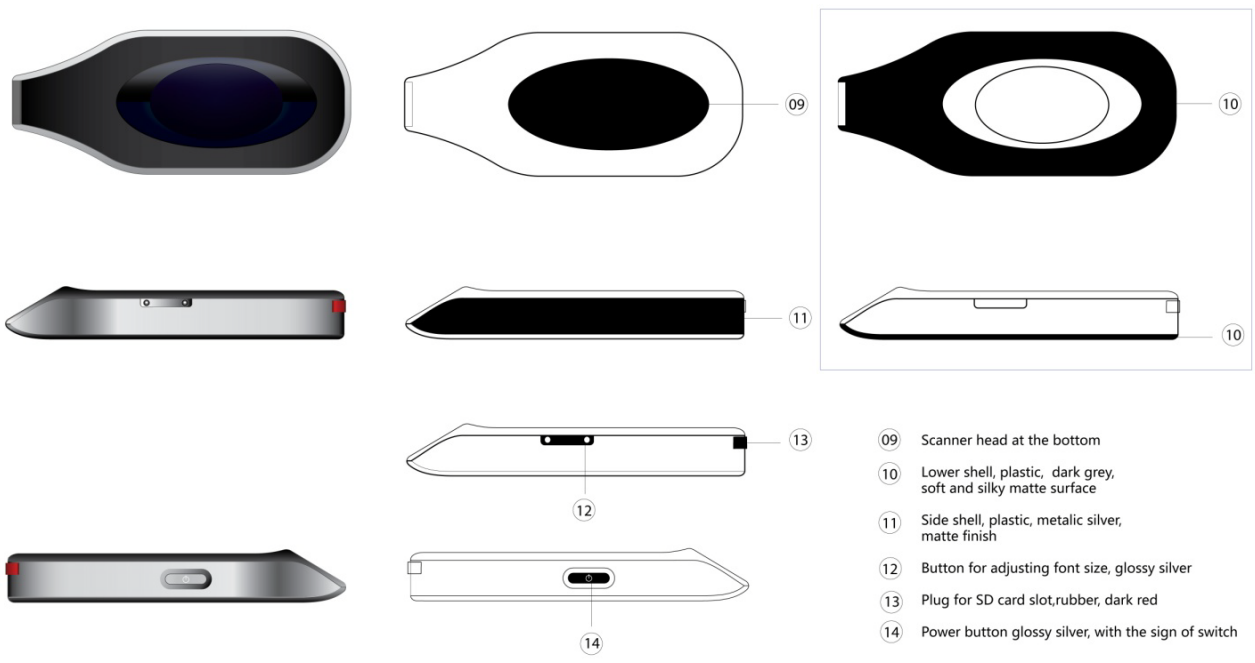
14   Power button glossy silver, with the sign of switch

3.4 The scenario

The pen scanner is mainly designed for student, scholars and people who need to work with what they are reading. It is designed to be a handy tool to help reading as well as related reading activities. It is a scanner that readers can scan and store text in the memory for further use. To scan, hold the pen as holding a highlighter, placed the tip before texts, slightly press and move horizontally with steady speed. When it is scanned correctly, the indicating light will show green, otherwise blink red. Without doing anything else, the scanned text is stored in the memory. By pressing the touch tag, the scanned text is sorted accordingly. (Figure 3.9) If there is a new word in the scanned texts, highlight it and press Dictionary button to look at the definition or translation. It is also possible to scan to look up words only by pressing the Dictionary button and scan.
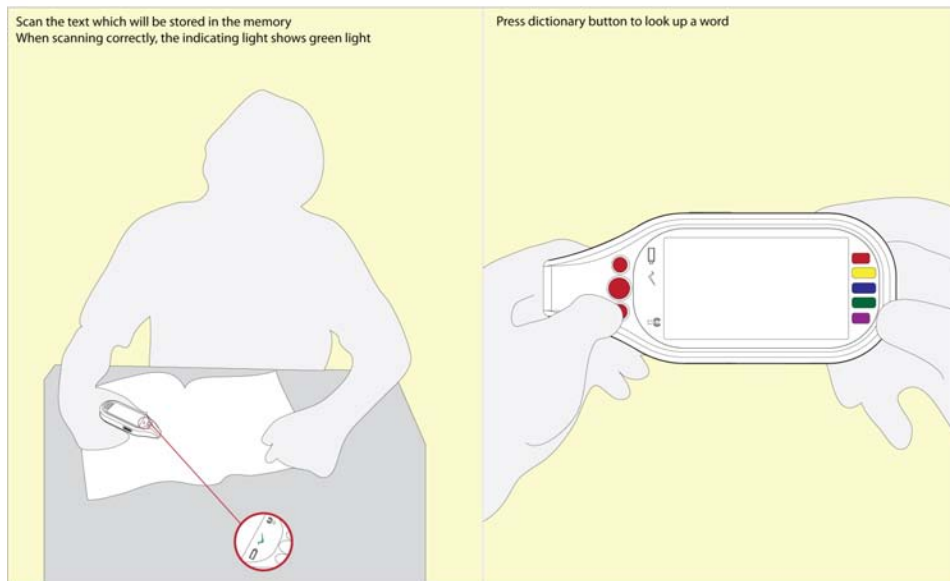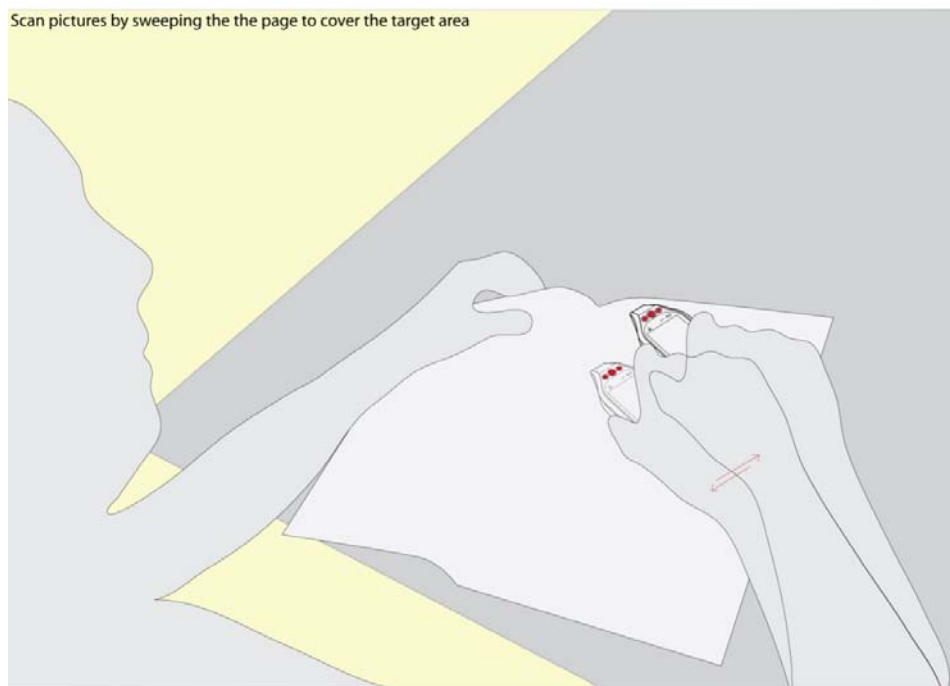

Figure 3.9

Scanning and editing can be cumbersome, especially working with a lot of texts and pictures. With the sensor at the bottom, users may scan pictures or larger pieces of texts by sweeping it over the page to cover the target area. It gives a natural hand gesture and reduces the distraction from completing scanning work. With the built-in program, which stitches every overlap edge into a complete image, the result would be picture format of texts or pictures as the same as on paper. (Figure 3.10)

Figure 3.10

Scan pictures by sweeping the the page to cover the target area

Readers can select scanned text and text from internet by sliding fingers over to highlight it. By pressing Search online button, it will search the result in Google Web, Google Book, and Wikipedia online. By moving fingers on the touch screen up and down, left to right, reading window is adjusted and web pages turns. (Figure 3.11)
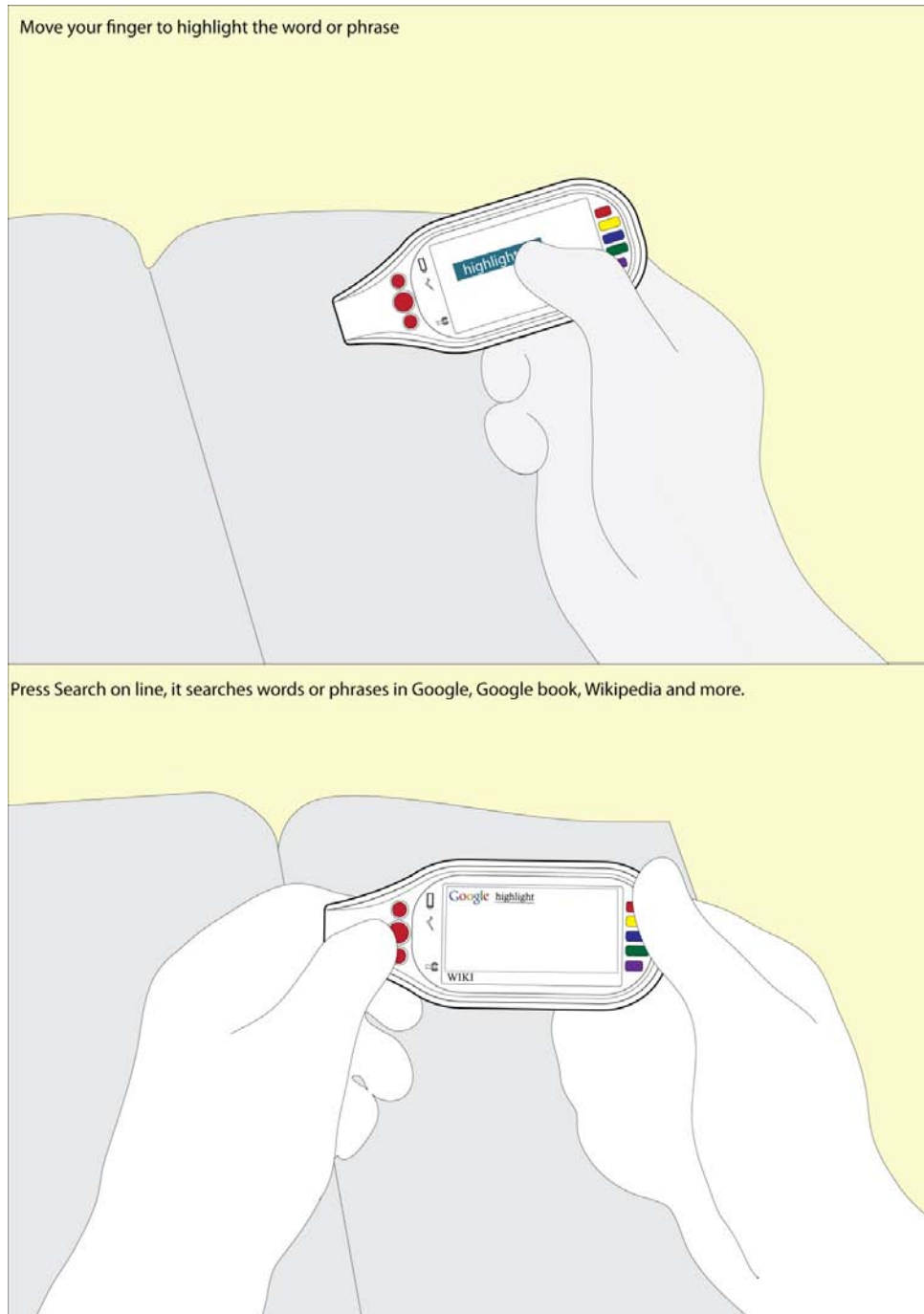

Figure 3.11

Button Review enables readers to browse all scanned and searched content in a different order. Therefore, it is easy to locate what the reader has read and content stored one hour ago, or one day ago. It is easy to relocate it according to titles, scanned date and tags or all of them together. Comparing text among pages and books would be easier. (Figure 3.12-3.13)

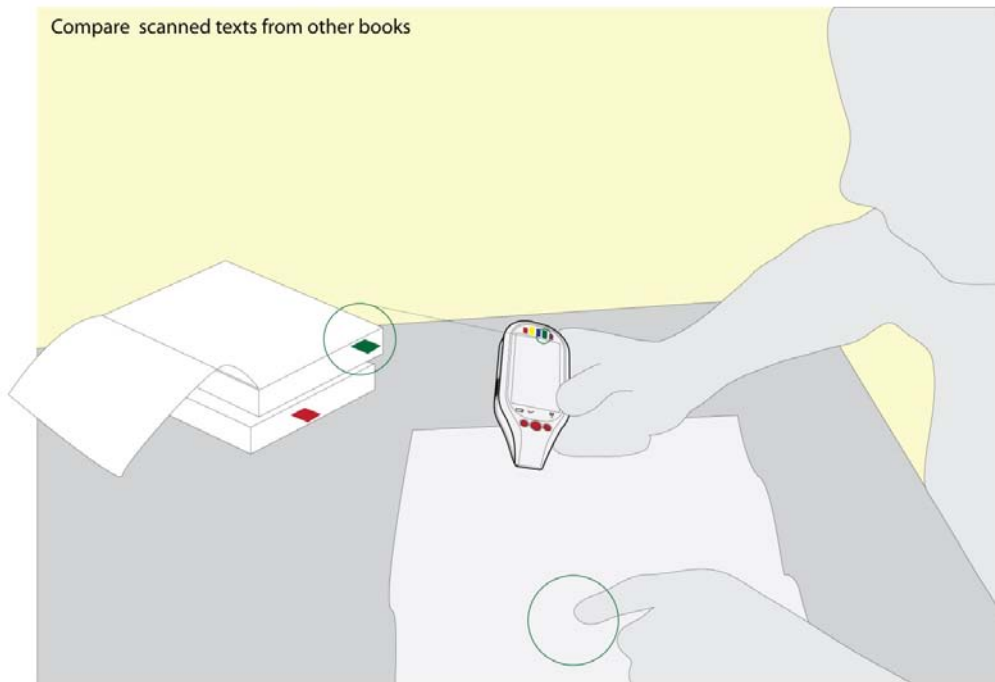Compare scanned texts from other books

Figure 3.12

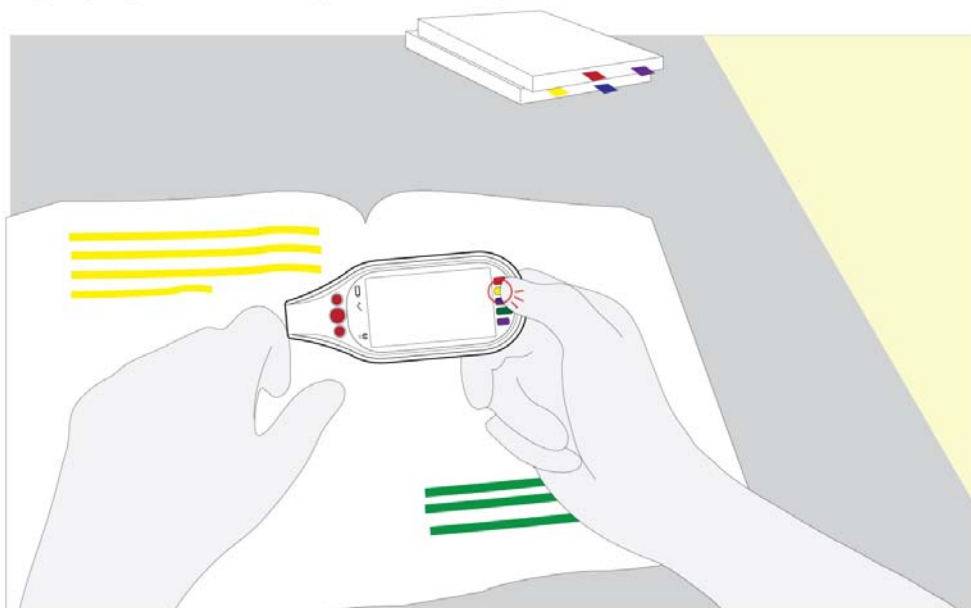Using the digital tag to mark scanned text, categorize them for better arrangement

Figure 3.13

The pen scanner can be connected with a personal computer. When it is connected, the scanned texts, pictures and tagged resource from internet will be transferred to its own program. With the program, users can review texts and pictures according to titles, scanned date and tags. Contents can be edited with word processing program and pictures manager. (Figure 3.14)
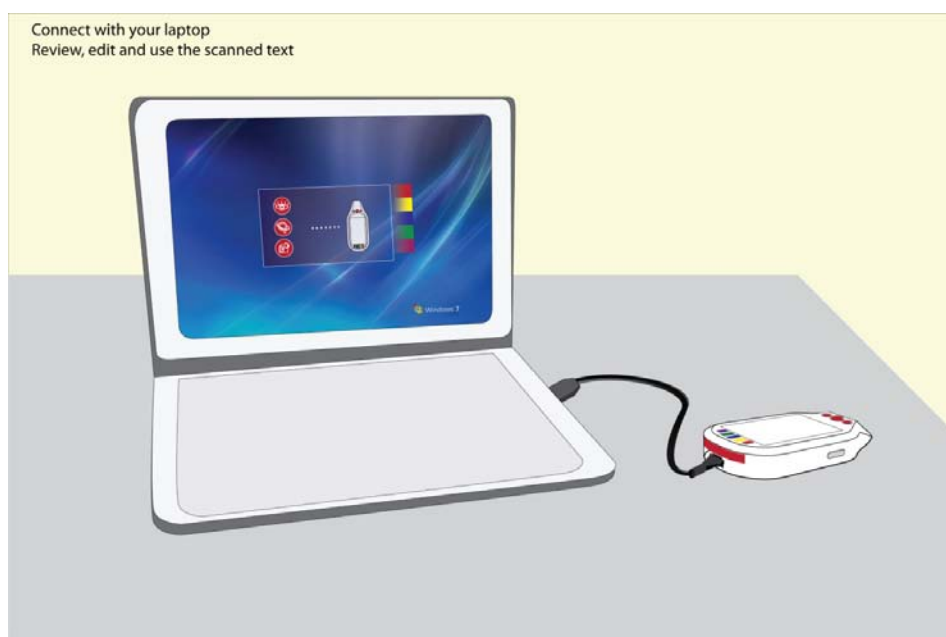

Figure 3.14

3.5 The fine model

The model aims to give an expression of simplicity and reliability which is inspired by pebbles. The main body of the model is made of ABS[27] plastic and the screen is made of PMMA[28] plastic. The upper and bottom shells are visually treated soft and organic. The middle shell is treated as matte metallic silver to express a hint of high-tech style. It reflects the quality of softness though being firm, organic but rational which are distinct characters of this portable scanner. (Figure 3.15-3.18)

Figure 3.15

Figure 3.16

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[27] Acrylonitrile butadiene styrene (ABS) is a common thermoplastic used to make light, rigid, molded products. From Wikipedia.com
[28] Poly (methyl methacrylate) (PMMA) also called acrylic glass is a transparent thermoplastic. From Wikipedia.com

Figure 3.17

Figure 3.18

4 Discussions

4.1 The market

More than five years ago, pen scanners appear in the market. They are models which are designed to handle multi-task. Companies think users would like it as a barcode reader for business, a text copier, a dictionary, a handwritten recognizer, and much more. Although the idea of a pen scanner is very good, it doesn't work that good, users were not convinced by its capability of character recognition, which is the crucial function for a pen scanner. Therefore, some advanced models disappear after the trial, only those simple ones with single function stayed in the market. For example, C-Pen20 from C-Technology AB is a pen scanner that only scans and transfers texts to the computer with a connected cable. In Gothenburg, there is a retailer company called YDIS. It sells the model "Quictionary" from Wizcom. It is also modified to single function, translation or dictionary.

The "Reading Partner" is a scanner for reading and related activities. It is a bridge to connect people, books and internet media. It is especially for people who read often and read for work. Book stores and souvenir store in the library or museum, and stores who sell consumer products are potential places to sell it.

4.2 The price

The first fine model without functioning would cost 2800SEK (Model price form China). This is similar to the normal price for making fine model of a nice cell phone in China. The size and the function setting of "Reading Partner" are similar to a cell phone. The advanced "Quicktionary" of YDIS costs 2295 SEK, as a cell phone can cost. Thus, we can speculate about the price of this new scanner model is comparable to a cell phone too. According to the material and crafts, built-in program and relevant technology, I believe the cost of "Reading Partner "would be around 3000SEK to 5000SEK or even lower if it becomes mass produced. The Kindle DX costs around 3435SEK which is very competitive. Multifunction and big display is the key for people considering purchasing it with this price. The "Reading partner" would have big potential to develop to a professional tool to deal with texts and pictures, information in printed material and on internet.

4.3 The model

In my opinion, the model is successfully done in this design phase. I am satisfied with the size and the volume of it. The screen is big enough to show any information for users to read comfortably. The product looks cheerful and friendly in general. I like the contrast between the dark matt and the metallic silver. It looks stylish as well as reliable.

It feels nice to hold in a certain way, or in the designed way; the way of holding a highlighter. If we hold it with our thumb on the upper shell, and the forefinger at the side, it feels comfortable and natural. On the contrary, it is not very nice to hold it as to hold a pen normally, therefore it lacks of certain flexibility which can be reconsidered.

It is certainly easy to handle with one hand; readers can use it when they stand holding a book in the other hand.
The portability enhances the quality of mobile reading, e.g. reading in the library or on the train, especially when readers are studying and looking for resources and information among many different titles. (Figure 4.1-4.2)

Figure 4.1   Figure 4.2

4.4 The form

It is a long process to get the right form. At the first beginning, the handheld scanner is designed as a credit card that could easily be brought in the pocket and wallet. (Figure 4.3) (Supplement 7.4) But the square shape doesn't fit in hands naturally. Then I feel it must be something nice to hold, something soft and round. It reminds me about pebbles along the seashore. I went to pick pebbles and felt them in my hands. I got inspired. There, it becomes a simple round geometry. (Figure 4.4) (Supplement 7.5) In my opinion, it must be simple and sufficient. With the second design, I develop most of the function which could be involved. But, the form again, lack of association with books and hands.

It is important that people feel comfortable to hold it, read books with it, scan with it and read text on it. I sketched again, and evaluated the pen scanner in the market. (Figure 4.5) (Supplement 7.6) I think the shape of the highlighter can be kept and be developed. Therefore, the new design resembles a highlighter with a touch screen that is big enough to read with.
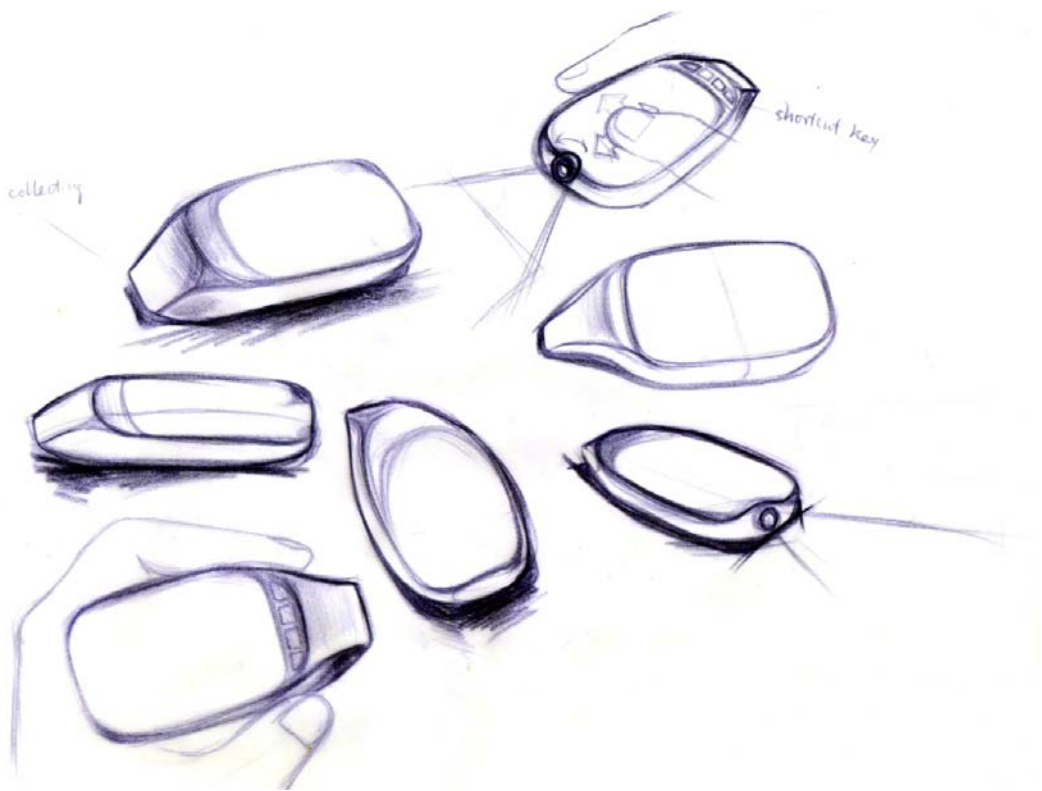

Figure 4.3   Figure 4.4

collecting

shortcut key

Figure 4.5

4.5 Scanning function

In the matter of scanning modes, I decided two ways of scanning, scanning word by word as the traditional way, and sweeping over the page back and forth to scan. The traditional way is more proper when we are carefully reading word by word. The scanning work is done when we stop reading spontaneously. "Sweep" scanning is more casual since it does not restrict our hand gesture to a certain way, or it doesn't need attention to keep alignment, etc. If we call every single part of a picture "frame", then the only thing is to make sure all frames are overlapped with each other so that the program can stitch them up to an integral one. According to the theory of scanner and already existed photo stitching program, (supplement 7.3) it is quite possible to embed the program within the scanner and make it function well. Having the scanning posture natural and comfortable is the approach to increase the working efficiency.

4.6 Possible development of the concept

A main trend about nowadays activities is sharing and be socialized. This is apparent on internet. People share their stories, news, opinions, favorite songs, recent activities, everything online. People find lost contact on Facebook, get job through LinkedIn. Sharing and be socialized become the modern lifestyle. In my mind, there are three ways of developing the "Reading Partner" in a social perspective. The first idea is sharing button, which can be integrated to the current concept. The reader can select anything from his own collection to publish online, with its own program. People who share similar content will be connected, the more we share, the more we get recommended just according to one's specific taste and preference. The second idea is to integrate print function. This is inspired by zero ink technology, a new way to print in full color without the need for ink cartridges or ribbons. Therefore, ZINK photo printer in a cell phone- sized device shows the possibility. The pen scanner scans and stores text, searches and edits text. With ZINK technology, readers can make their own reading note card simultaneously when they are reading. If it is in adhesive paper, it can even be used as post-it for sharing passages with friends, colleagues, family and oneself. The third idea is to integrate projector. This is inspired by mini projector and Microsoft Surface technology. The idea is to project scanned texts on any flat surface that readers could move around clips of passages to study and compare.

4.7 Culture sustainability

The aim of the "Reading Partner" is to help people to enjoy reading, and help organizing and preparing material for further work. Ann Thorpe, the author of The Designer's Atlas of Sustainability, suggests that the mission of culture sustainability is to create and maintain general human well-being. People have the need to achieve a set of well-being, for instance, the need for leisure, healthy affections and ability of understanding. "Most of nine needs are emotional and intellectual in nature and are frequently best satisfied by looking inside oneself to develop abilities to pursue a meaningful relationship and personal growth."[29] And according to the needs theory, "internal means of meeting needs works better than external means. When the needs are not successfully satisfied, the result can be negative feelings, such as depression, anxiety, low energy and loneliness."[30]

I consider reading is one of the internal means of meeting the need of knowing, relaxing, exploring, etc. Reading a book brings much more than the need of getting information which we usually do on internet. When we look upon it on the cultural level, reading brings us back to a more healthy way to live in this century which in people's mind is experienced as a fast-paced materialistic way of life.

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[29]Ann Thorpe, 2007,The designer's atlas of sustainability, Island Press, p116

[30]Ann Thorpe, 2007,The designer's atlas of sustainability, Island Press, p116

Reflection

The relationship between people and reading

From the beginning, the aim of this project is to spread the value of reading books. Since libraries play a role of city community center with modern resource management systems, I studied how a library appeals people and how to offer better service, in the perspective of the relation between people and books. In my opinion, the solution would not only be a useful object, but also service which interests people in reading books and get benefit from it.

I have a thought regarding the full text search system and hope people would make use of it to benefit reading. Google Books project is dedicated to such a full text search system that people could find information from searching titles of books and contents on exact pages of a book. I believe that it helps to spread knowledge and the value of reading, as we could find rare and valuable materials and read entire books which are in the full text system online.

How to make people like reading and start to read and discover more? Is there a way to connect books that are relevant? Is there a way to help reading books in this internet society? What about the need of gathering and sorting information which becomes daily task for everyone? Many questions are raised related to reading and information processing, in a perspective of the relationship between reading as human culture and people themselves.

It took me a long way to get to this result. I have been looking into the issues of reading, and focus on the relationship between people and reading from the first beginning, from reading in the library to reading books with the need of working with the texts.

Reading is such a cultural activity that people have such profound feelings for books which have been traditional reading media all along. Books are something we should not give up, but we welcome techniques to make reading more interesting and effective. Therefore, this "Reading Partner" is designed to play a role to bridge printed material to digital world.

When the direction of design was fixed, the focus changed. A pen scanner which is comfortable to use becomes the most important. User experience is crucial, involving smooth operation and pleasant emotion. I was inspired by pebbles, and showed the sketch model and described the intention to a few readers, and they all agreed that it is nice to simulate holding a pebble which brought a hint of calm affection.

It is very interesting to study the relationship between people and reading, especially since the issue of e-reading has being discussed a lot lately. I am here to give my opinion that books cannot be replaced, instead, we find a way to use it   as it is the

media which spread knowledge and information.

The solution is only a proposal; an idea; a concept. It is a long way to truly realize it, especially from the technical factor. But, it is promising, I believe.

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7 Appendix

7.1 The specification of Kindle DX

Technical details

Display: 9.7" diagonal E Ink® electronic paper display, 1200 x 824 pixel resolution at 150 ppi, 16-level gray scale.

Size (in inches): 10.4" x 7.2" x 0.38".

Weight: 18.9 ounces.

System requirements: it doesn't require a computer.

Storage: 4GB internal (approximately 3.3GB available for user content).

Battery Life: Read on a single charge for up to 4 days with wireless on. Turn wireless off and read for up to two weeks. Battery life will vary based on wireless usage, such as shopping the Kindle Store and downloading content. In low coverage areas or in 1xRTT only coverage, wireless usage will consume battery power more quickly.

Charge Time: Fully charges in approximately 4 hours and supports charging from your computer via the included USB 2.0 cable.

Connectivity: EVDO modem with fallback to 1xRTT; utilizes Amazon Whispernet to provide U.S wireless coverage via Sprint's 3G high-speed data network.

USB Port: USB 2.0 (micro-USB connector) for connection to the Kindle DX power adapter or optionally to connect to a PC or Macintosh computer.

Audio: 3.5mm stereo audio jack, built-in stereo speakers.

Content Formats Supported: Kindle (AZW), PDF, TXT, Audible (formats 4, Audible Enhanced (AAX)), MP3, unprotected MOBI, PRC natively; HTML, DOC, RTF, JPEG, GIF, PNG, BMP through conversion.

Included Accessories: Power adapter, USB 2.0 cable, battery. Leather book cover sold separately.[31]

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[31] Kindle DX: Amazon's 9.7" Wireless Reading Device (Latest Generation), www. Amazon.com

7.2 Google books

Google Books[32] is the project to make book content more discoverable on the Web. According to the Google Books Settlement Agreement, millions of in-copyright, out-of-print books, would be greater exposed to enable students, scholars, and readers to search, preview, and purchase online access to these works; it will open new opportunities for authors and publishers to sell their copyrighted works and to maintain ongoing control over the ways those books can be displayed, etc.

With Google books search, we can search over the full text of some seven million books. The books come from two sources, the Library Project and the Partner Program. For Library Project books that are still in copyright, the results are like a card catalog; it shows us info about the book and, generally, a few snippets of text showing your search term in context. For Partner Program books, we can flip through a few preview pages of these books, just like you'd browse them at a bookstore or library. You'll also see links to libraries and bookstores where you can borrow or buy the book.

"Google's mission is to organize the world's information and make it universally accessible and useful. Now Google consider this agreement is a real win-win for everyone, the real victors are all the readers. As it says on official Google books websites, "We hope and expect that this leap forward with our friends and partners in the publishing industry is just the first of many. We love books at Google, and our fondest dream is that Book Search will evolve into a service that ensures that books, along with their authors and publishers, will flourish for many years into the future."

7.3 The specification of C-Pen 20 and Quicktionary TS

C-Pen, from C Technologies AB, is a mobile information collector that reads, remembers, processes and transfers printed text into digital format. Users can read and save text from printed materials. Your saved text files can later be transferred to the computer. It is also possible to use C-Pen to read text directly into a Windows application.

The C Pen 20 has a built-in dictionary, C Dictionary, which shows instant translation on computer screen by one stroke. It is claimed to be good for study and small office/home office. In scanning mode, users can scan the text with one stroke and the content pops up in editable format in Word, PowerPoint, Excel or other similar applications. In translation mode, users scan text, and the result shows on the C Dictionary application simultaneously. Thus, the product is marketed to be people's reading friend, as it is promoted on C Pen's homepage.

C Pen is designed to be used as a highlight pen. Place the tip of the pen before the first character to be read with two supporting legs positioned above and below the text line separately. It starts to read when the automatic trigger under the leg is pressed onto the surface, and will continue to read until the automatic trigger is released. It is also good for left-handed, as it can move either left-to- right or right-to-left over the text.

Although C Pen makes the transferring printed text into electronic format much easier, it is not perfect. According to user reviews on amazon.com in 2006, the defect is as below: It requires a computer connected, otherwise it doesn't run. It doesn't handle older typefaces, and sometimes symbols (such as footnotes). It doesn't recognize handwriting and doesn't work well on texts with colored background. Although C Pen is good for extracting pieces of texts, short passages, it can only scan one line of text at a time, so it won't be effective if users need to copy many pages of text33.

Researchers and students find the most benefits of using C Pen. They use it to take notes from books. The process of transforming printed data into digital format saves a lot of time. Although not everyone can handle it correctly to get text scanned accurately, the idea of C Pen convinces users and most of them give it a good credit.

Quicktionary TS
Quicktionary TS(QTS) from WIZCOM is a pen scanner especially for translator market. It has a 5-way button for navigation, a touch screen, a speaker, an earphone socket and a stylus. It scans a word or a full line of text and provides immediate word-by-word translation, including idioms and phrases, on the screen. It provides audio pronunciation with Text- to-Speech technology for selected languages, and included word games to practice vocabulary. It has history option that can retrieve last 80 reviewed words. The good thing about QTS is that it doesn't need to connect to a computer to run, instead, the translation result shows on the device. The QTS focuses

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[33] T.Bryan, An essential tool for students and researchers,Dec.30, 2006

more on software application than storing and organizing scanned texts, for instance, it has auto-complete function when inserting words using the virtual keyboard or one can toggle between abridged and complete definition/translation. But the screen is only 61mm x 20mm, which I find it might be too small to operate on it.
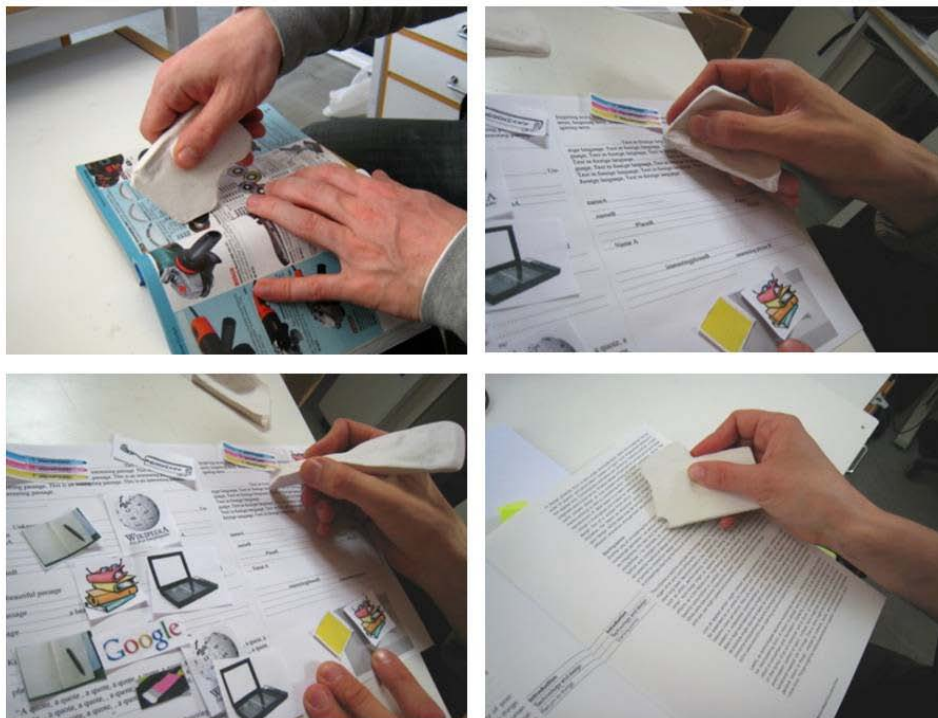

C Pen 20

Quicktionary TS

7.4 The previous design 1

In my opinion, a handheld scanner doesn't need to look like a pen. The function of a pen is to write, and then the design focuses on giving a comfortable and easy grip, as well as smooth writing. The scanner has more complicated mission as a scanner; a dictionary; a translator; and a collecting tool.

The first idea is to design the scanner as a credit card, which is easy to put into a wallet, or function as a bookmark. I have made a few sketch mock-ups in different shapes, and test them with several design students. Though I didn't get any concrete conclusion, the process is worthy and interesting. It is about discovering the need and their feelings of having a scanner in hands.

The design is inspired by the mock-ups test in which I observe the dictionary and translator function would be popular to fulfill the common need in the reading. The scanner is about a card size, 80mm*50mm*7mm. The square shape makes it look more suitable for working in the office. It is designed to be a set with a solar charger, which can be attached with a small pocket organizer that people may often take with for work or travel.
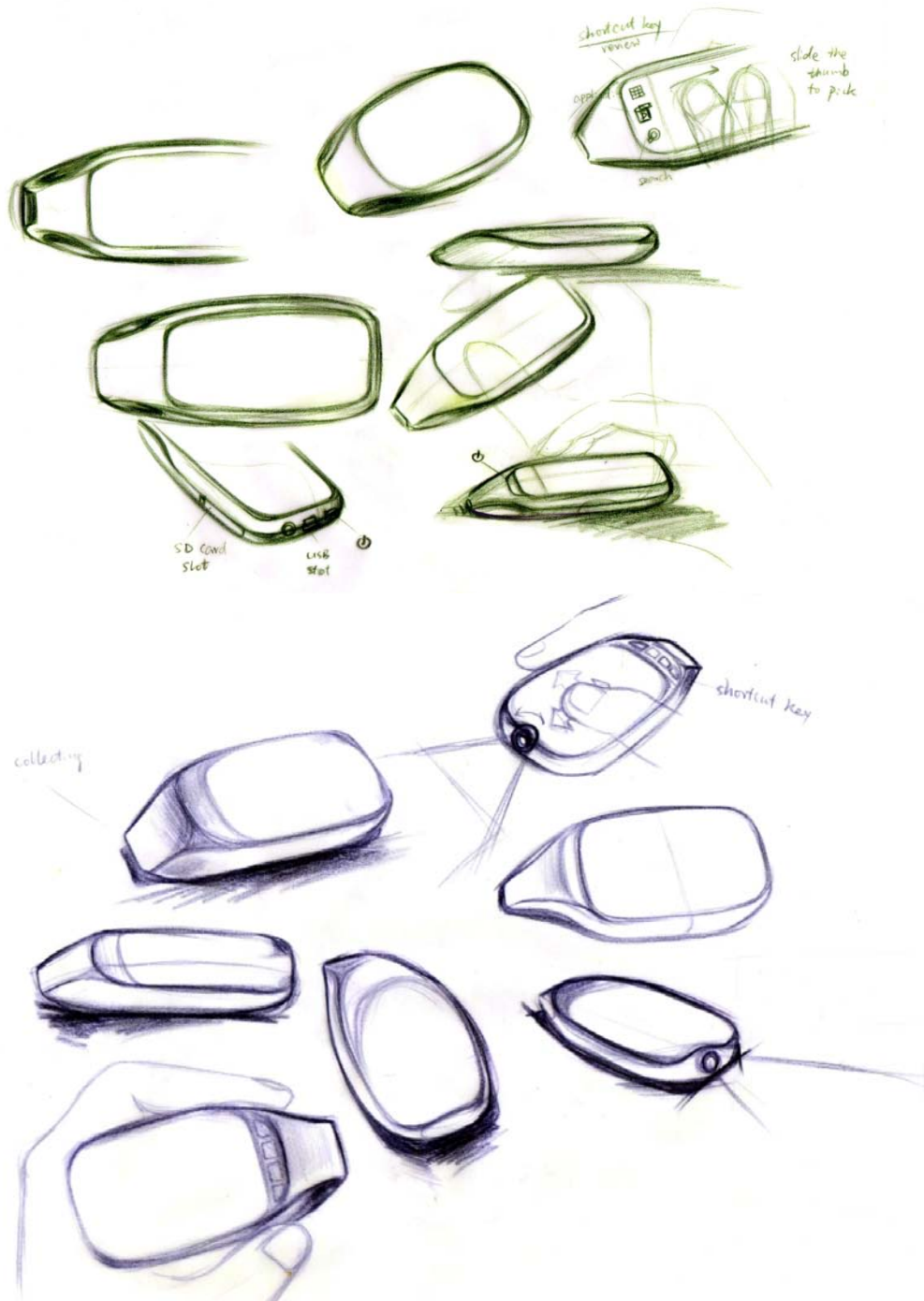
7.5 The previous design 2

The feeling of holding a small pebble is very comforting. The proper shape and weight gives a hint of good quality. It feels natural to have it filling up your palm. It is nice to hold a thing like this that we don't feel bothersome. Therefore the pebble becomes the other prototype of the Reading Partner.
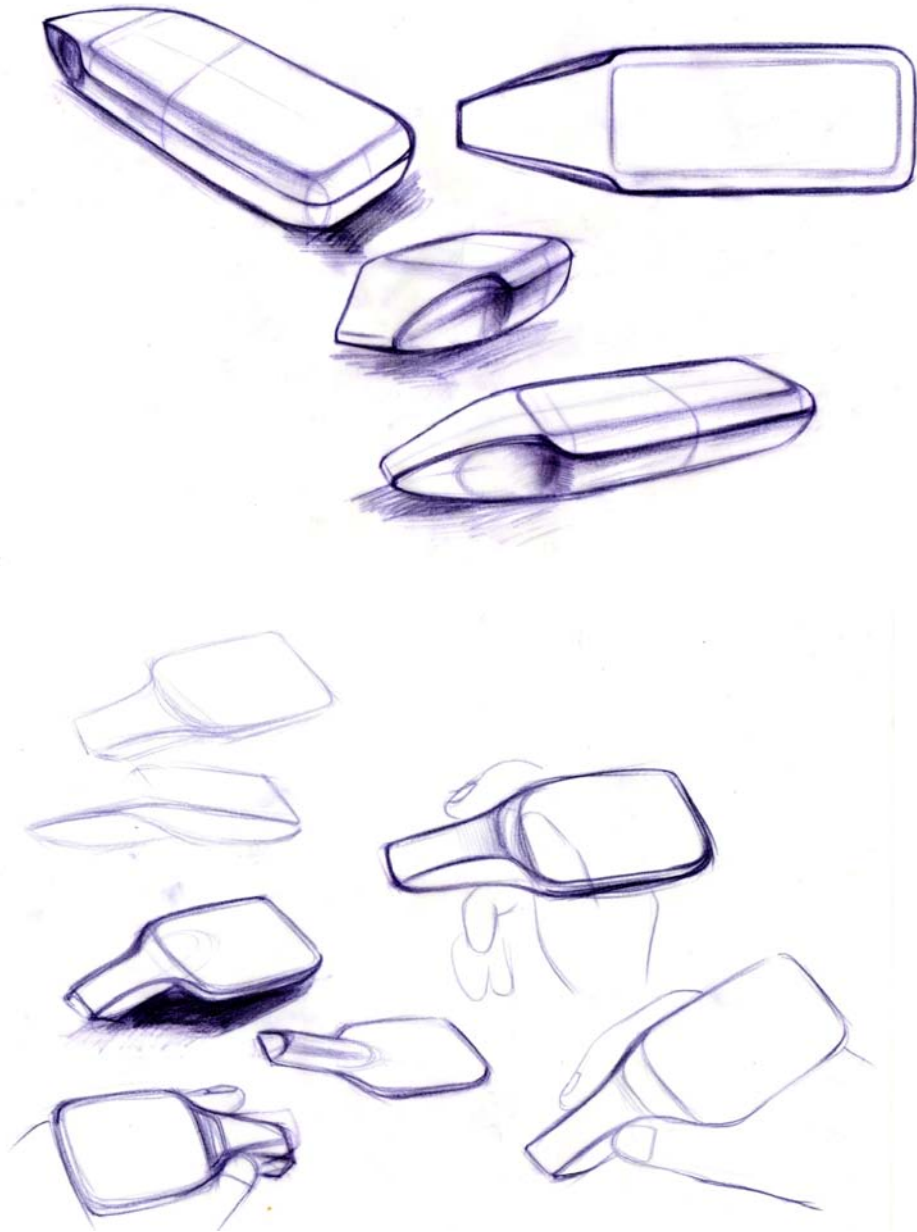
This is a design which leads me to the final design presented in main text. The idea of designing it as a round smooth pebble-like scanner is settled.

The volume is about 70mm*40mm*15mm, and the valid screen size is about 64mm*34mm, which is quite good to support the dictionary or translator function. There is only one button for switching the power on and off and a micro-USB slot to connect to computer or charge. The background lights up with blue color, when the Reading Partner is on. When it scans, the background light varies to show different working mode. A floating menu follows the fingers position that it is designed mainly for the convenient of the thumb originally. It recognizes finger gestures such as sliding, tapping and pressing. The menu can be slid away to the side and locked when it is not in need. It has three main functions, dictionary, translator and scrapbook. The first two functions are for the need during the reading, the scrapbook is mainly for reviewing reading history in brief.
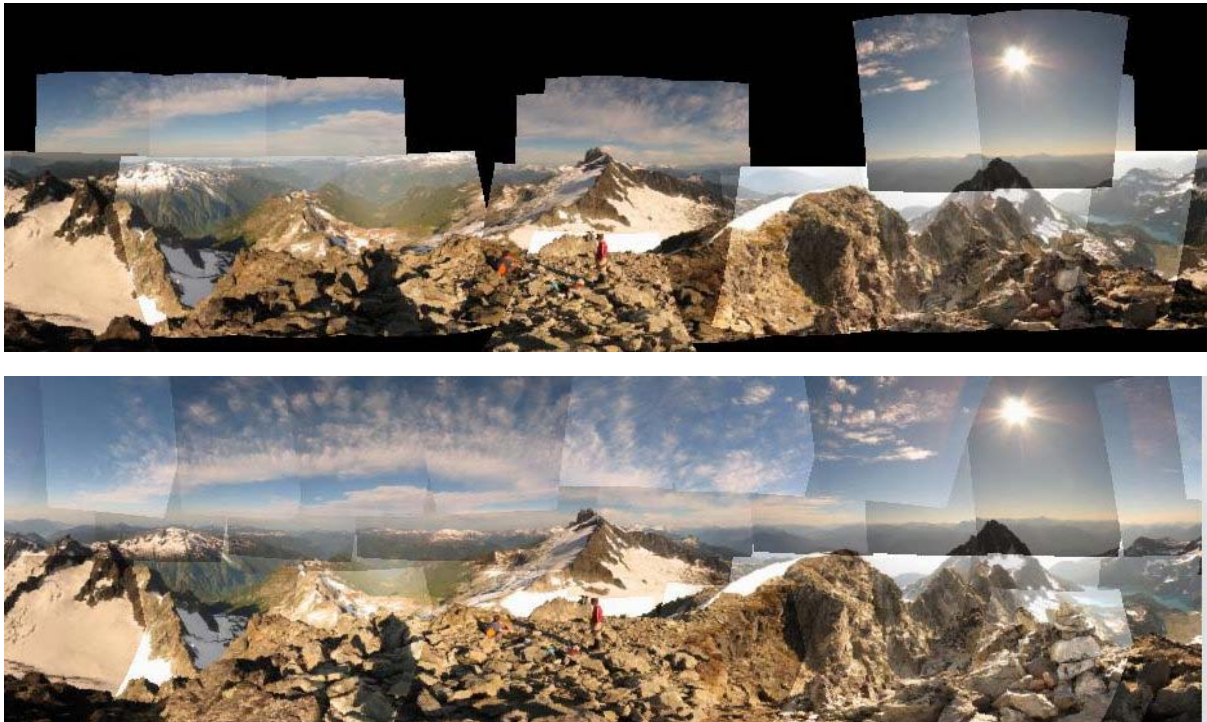
7.6 Selected sketches

7.7 Photo stitching program

It is usually used to stitch numbers of photos into a panoramic image. Pictures which need to be stitched together should be able to joined together, in another word, there are areas that are overlapped. Photo stitching program can stitch rotated and tilted images

AutoStitch (www.autostitch.net) is an example of how a program can do to stitch pictures together. References as following:

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