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BSIM4449 Project

Title:

Encourage the use of a digital library in stimulating primary students in English Reading

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Table of Content

Executive Summary

Reading in the 21st Century is no longer confined to reading print books. Reading habits of children seems to be shifting from print to digitalized books with advanced technology (Bodomo, Lam et al. 2003). With no comprehensive digital libraries (DLs) designed for Hong Kong children, the purpose of this paper is to develop a child-friendly digital library prototype for children in response to the dynamic reading culture in Hong Kong. The paper is divided into 2 parts. Part 1 examines the needs of a children's digital library with respect to modern day reading trends. Part 2 examines the digital library interface design in order to propose a customized user-friendly digital library interface for children.

In Part 1, our team used findings from literature review, questionnaires and teacher interviews to determine the needs for the use of a digital library in encouraging Hong Kong primary-aged students in English reading and also to develop a prototype design.

In Part 2, before proceeding to the prototype design, our team used literature review to study the digital library assessment criteria. Then, we further used heuristic evaluation to compare the strengths and weaknesses of 3 interfaces for children's digital collections, namely International Children's Digital Library (ICDL), Baldwin Library

of Children's Literature Digital Collection (BLCLDC) and Longman English Reading Website (LERW). As we determined to use the interface provided by the ICDL as a starting point to form a basis to develop the prototype design, a questionnaire was also used to test children's fondness with respect to visual appearance and screen layout design, navigation and search options in using the digital library. The findings drawn from the questionnaires are important in determining elements which a children's digital library should possess with. The extracted DLs elements drawn from the questionnaire would then be used as a foundation for observations. The observations asked participants to verbalize their thoughts as they completed a series of tasks. A customized digital library interface for children will be introduced at the end of this paper.

Based on the findings and recommendations from our research, we will redesign the International Children's Digital Library (ICDL) interface and search options for building our prototype. Other features, which facilitate children's reading progress, would also be suggested.

It should be noted that due to a relative small sample, the findings may not represent the general comments towards DLs design. Besides, since our research focused on the

use of digital library in encouraging children to read, the content of books, which is considered core value for literacy, is not part of our scope.

With the belief that DLs could provide engaging reading environment for children in today's information age, our customized DL prototype would definitely essential for children to access and retrieve reading items online everywhere and every time.

PART 1 Needs Assessment for a Children's Digital Library

Introduction

Reading is not restricted to print formats in the information age, and reading habits of children seems to be shifting from print to digitalized books with advanced technology (Bodomo, Lam et al. 2003). In Hong Kong, Pearson Education Asia Limited is one of the leading publishing companies. Its continuous effort in encouraging children reading is renounced for providing a range of supportive electronic items, such as electronic books and Penguin Active Reading websites (http://www.penguinreaders.com). However, there are no comprehensive digital libraries (DLs) for children in Hong Kong yet. A children's DL should be further designed to provide engaging reading environments not simply to support the tasks of schooling, but also to support literacy as a social practice.

In PART 1 of this report, we will examine the needs of a children's digital library with respect to modern day reading trends. Findings from literature review, questionnaires and teacher interviews are supportive to determine the needs for the use of a digital library in encouraging Hong Kong primary-aged students in English reading. In PART 2, we will then examine the digital library interface design in order to propose a customized user-friendly digital library interface for children.

Project Objectives

This research report has three objectives. They are:

1. To evaluate the facts of digital collections on children's reading habits;
2. To identify key elements which a good digital library should possess;
3. To develop a child-friendly interface that supports children in the performance of easier searching, browsing, reading and sharing

Literature Review

Introduction

Copperwiki (2008) mentioned that “reading doesn't just happen. It is a skill that must be nurtured from a child's earliest years.” Undoubtedly, reading books is important in children’s cognitive and social development. Books can help children to understand who they are, explore the world around them, and contribute to a child’s ability to be literate in today’s society (Hourcade & Bederson, 2003). For past decades, schools have had put much efforts in encouraging reading (Morrow 1982) by different activities, such as Reading Aloud, Free-Choice Read, Book Chats (Morrow 1982), etc. But the effectiveness is questioned as children’s reading is becoming diverse in today’s information age (Kaplan and Chisik, 2003).

Today, Internet technology makes it possible for users all over the world to access the same collection of materials on demand through DLs at tertiary level (Hourcade & Bederson, 2003). But “little research” has been conducted in promoting the use of DLs at primary level (Xu, 2007). Additionally, many schools still use old traditional ways to educate students of the new generation.

Therefore, online digital libraries can be beneficial to readers around the world, “not only for the obvious benefits of broader dissemination of information and cultural

awareness, but also as tools for empowerment and strengthening community. (Hutchinson, Rose, Bederson & Weeks, 2005)" Furthermore, online digital libraries can provide multi-dimensional and multi-modal environments, which can change children's preferences and reading styles (Kulkarni, 2005). Children "have become more 'active' in the process of reading by clicking and browsing through webpages and hyperlinks." (Bodomo, Lam et al. 2003)

Part 1 Library and Reading

Libraries are considered as the first step to help children to literacy. Being regarded as part of the 'enhanced' curriculum of the school, the overall mission of the library is to support and enrich educational programs of the school by providing appropriate materials on a variety of interests, ability and maturity levels and to help students become intelligent users of the library through a planned program of instruction (Crowther, 1993).

Although the use of physical libraries is common for kids to find books and information for school reports, and learn news about the globe, research from Walter (2003) shows that a resounding 94 percent of kids prefer to use the Internet over all other sources for school research. Thirty to forty percent of all teenagers can be

considered heavy Internet users (Walter 2003).The role of traditional libraries in the literacy lives of teens “may be diminishing” (Kaplan and Chisik, 2003) in today’s digital world.

Children’s View towards Reading Activities at Schools

1. Peer Influence

Kids said that libraries are not cool. If their peers do not think it is ‘cool’ to read, they may give up the practice of reading in an effort to belong and fit in (Walter, 2003).

2. Read for Assignments

Unlike in the past where “children sense what the teacher views as important and often take on those values themselves” (Morrow 1982), children do not like being told what to read, and they did not like being told how to read it today (Walter, 2003). Majority children read books, as reading is mandatory in schools. Schoolteachers and librarians recommend books to their students by providing booklists and so children may feel pressured to read books that are listed in such booklists. As a result, they would not prefer to read books for fun (Kulkarni, 2005). For example, schools provide booklists to students that are mostly created by schoolteachers or librarians. For children, such booklists are just another piece of paper given by teachers like an

assignment sheet (Kulkarni, 2005). Instead, they would play video games or go on to Internet more often and gather information about their world rather than going to physical libraries or reading books. (Kulkarni, 2005)

3. Inadequate Library Resources and Space at Schools

Although schools have put effort into facilitating reading by building an attractively designed central libraries and smaller classroom libraries at schools in order to provide “immediate access” for kids to reading materials, kids complained that those materials provided by schools are “old-fashioned” and not “what they want” (Walter, 2003). More importantly, they think that the library service hours are inconvenient. They wanted more welcoming space, more access to higher end technology, more help with their homework, and better books and magazines. They wanted less restrictive rules and fees. (Walter, 2003)

Children’s View towards Internet

Additionally, internet is popular in the information age. Hutchinson, Rose, Bederson & Weeks (2005) states that “Children and teenagers use the Internet more than any other age group.” Kulkarni (2005) agrees that:

> “Internet has become new generation children’s favorite choice since they can create, share, and research things, receive information instantaneously, perform multiple tasks simultaneously, gather information using multiple medias such as visuals, graphics, sound, etc. instead of simple text and also can view information randomly and dynamically.”

Being regarded as a “shortcut” (Walter, 2003) for seeking materials, kids agreed that the internet enables them to juggle school assignments and extracurricular activities more efficiently. For the most part, they used the Internet as a virtual textbook and reference library. They also used the Internet as a way to collaborate on projects with their colleagues and as a “virtual locker, backpack, and notebook” where they could store their important school-related materials (Walter, 2003). However, the online reading activities taken by children are normally not regarded as literacy in the view of teachers

A Concluding Remark

Reading in the 21st Century is no longer confined to reading print books (Bodomo, Lam et al., 2003). The quality of physical library and school facilities is differentiated, making children’s reading benefit vary (Walter, 2003). Moreover, in the physical

libraries or bookstores, “printed booklists do not provide effective graphics, random access to information or instant gratification, which can be frustrating. Thus, these printed book lists hardly motivate children to go to the libraries or bookstores and read books.” (Kulkarni, 2005) Although adolescent culture is not always compatible with library culture (Walter, 2003), the changing attitudes of children would shift library development in a more challenging way. With the increasing popularity of the use of internet and the diminishing role of physical libraries, a good digital library is necessary to bridge the distance between children, schools and libraries, making reading books online available everywhere and at any time.

Research Methodology

With regarding to the literature review, further research should be done in order to provide more in-depth information on the use of DLs in facilitating reading in Hong Kong. The overall research objective of the research study is to interview the primary students and schoolteachers in order to design user interfaces appropriate for young children (ages 9-12) to access a collection of digitalized storybooks and, investigate elements of DLs and digital resources which attract children to read.

Two research questions are raised based on the literature review:

1. What are children's and teacher's relative views towards print and digital resources?
2. What are the elements (e.g. function and design) of a digital library and digital resources that encourage reading by primary-aged children?

The research question 1 was studied in *PART 1 Needs Assessment for a Children's Digital Library,* and the research question 2 was studied in *PART 2 Digital Library Prototype Design.*

In the research design, the mixed-method approaches were selected. Both quantitative and qualitative research approaches were used.

Quantitative Research Approach

The non-experimental quantitative research approach is a descriptive research with cross-sectional studies. The positivist method was adopted, which aimed to collect and analyze data from questionnaire surveys. This method was also approached in the deductive way. It was basically to test a hypothesis, "The use of DL is able to encourage children in reading", in PART 1.

Qualitative Research Approach

For the qualitative research approach, the interpretive method was applied. This inductive research method allowed collecting data through face-to-face interview with teachers by asking open-ended questions in PART 1. Also, user and task observations were used in PART 2 to collect data.

The variant data and contexts helped frame these mixed data collection methods resulted in a clearer picture of the participants' attitudes towards the DLs.

Sampling Methods and Sizes

Questionnaire surveys, face-to-face semi-structured interviews and observations were designed to collect data by convenience sampling, which was chosen as the sampling strategy because it is more flexible compared with statistical sampling methods. Also, this method is easy to adjust when a considerable number of respondents withdraw from or disagree to participate. One important reason is that these non-probability samplings do not incur too much cost or time required to select a simple random sample. 82 students in P4 – P6 participated in the questionnaire surveys, and 1 schoolteacher and 1 professor in the Hong Kong Institute of Education participated in the semi-structure interviews.

Questionnaire Survey

The questionnaire was designed to probe the following 2 major areas:

1. The reading habits of primary school students in Hong Kong towards electronic collection,
2. How the use of digital library to encourage electronic reading in primary schools.

The questionnaire design structures (Appendix 5) were divided into four parts:

1. Reading Preference;
2. Experience in using International Children's Digital Library (ICDL);
3. Reading and Digital Library; and
4. Personal Information.

The design format contained mainly a set of attitude statements by using the level of agreement or disagreement using a five-point Likert scale with given a numerical value ranging from one to five, dichotomous closed-ended and close-ended items. In order to generate a high quality questionnaire, pilot tests (Appendix 7) were run with 2 candidates.

The potential schools were contacted through e-mail invitations. Students from the available school were required to experience the International Children's Digital Library. Hence, a pre-survey activity (Appendix 4) was provided to their computer teachers, and the students gained the experience during their computer lessons before the surveys have been conducted in person.

Face-to-Face Semi-structure Interviews with Teachers

It was necessary to conduct interviews with teachers in order to facilitate in-depth understanding and exploration of the research study. So as to have a well-formalized structure, five interview questions (Appendix 1) were well-prepared in all open-ended formats to explore the teachers' perspectives on DLs. The major focuses of the five questions are:

1. the existing activities conducted by schoolteachers to encourage English reading; and
2. the acceptability of the use of DLs in schools by teachers.

The two teachers freely gave their opinions without any restriction. The interview contents were recorded by notes, and the qualitative data from the interview was served as further support, evidence and explanation for the results drawn from the questionnaire surveys.

Data Evaluation Methodology

The quantitative data from the questionnaire survey was analyzed using statistical methods. Since the survey mainly contained close-ended questions, they were easy to code with the statistics. The univariate analysis was applied, and data was presented in bar charts, pie charts, and arithmetic means. In order to facilitate the accuracy of the calculation, Statistical Package for Social Science (SPSS) software was used to generate the data, and perform the statistical analysis.

In order to determine the trustworthiness of qualitative data from the semi-structured interviews and observations, all the qualitative factors were defined. Significant statements and data directly related to our topic from open-ended questions in the teacher interviews were confirmed by the researchers to elicit meanings and insights from the words of the interviewees. At the same time, when the statements were compared to the questionnaire survey data, the integrity of the quantitative data could be confirmed. This methodological triangulation helped ensure the reliability and validity of the data.

In order to eliminate as far as possible the biases of the researchers in interpreting and

analyzing the data, all interviews and observations were conducted by one researcher and independently reviewed by another.

Data Analysis for PART 1

In this section, we present some of the most significant findings of the study, which lead to a more substantial suggestion in designing an improved digital library prototype.

As recognized that children's reading is rich and diverse, in which some readings are not considered as literacy at school, testing the acceptability of digital library of children and teachers is crucial before proceeding with the design of digital library prototype. Results from the questionnaire survey (Part 1 & 3) were first extracted to present children's perspectives, and then followed by interview results from the teachers to show their standpoints towards digital libraries.

Questionnaire Analysis

These findings are presented according to children's (1) reading habits, (2) use of internet (3) reading preferences for print and digital library resources; and (4) attitudes towards DLs.

(1) Reading habits

With the belief that "Children are reading less" nowadays, we asked children about the time they spend on reading, which might reflect whether they would be good readers. The question was 'Q.1 *How often do you read?*'

Result:

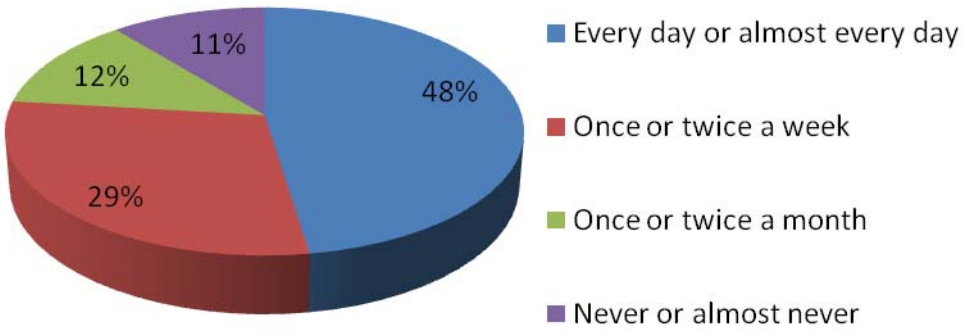


Figure 1: Q1. How often do you read?

We found that, out of 82 respondents, 39 read every day or almost every day. It implied that 48% of them are good readers who are eager to read.

(2) Use of Internet

The survey also looked at children's frequency and behavior in using internet. Since the introduction of DL aligns with the use of internet, testing whether

children are internet users is important in our study. The question was ‘Q.2 *How many hours do you spend accessing to the internet every day?’*

We categorized internet users into 4 groups:

Number of hours children spend on getting online per day	**Category**
More than 4 hours	Heavy Internet Users
2-4 hours	Frequent Internet Users
Less than 2 hours	Regular Internet Users
Never or almost never	Non-Internet User

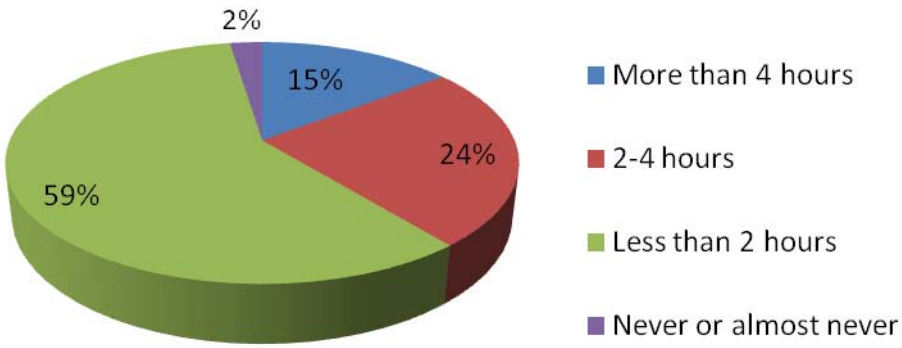


Figure 2: Q2. How many hours do you spend accessing to the internet every day?

We found that over 50% of the respondents get online less than 2 hours per day from the survey. More than a half of the respondents are ‘Regular Internet Users’. Only 3% of them have not experienced in using internet at all. The result erased the barrier in using digital library as they at least know how to get online.

We also investigated children's habits in using internet. As illustrated in the Figure below, 'Playing Games' , 'Doing school assignments', 'Searching references', 'Chatting with friends' and 'Watching videos from YouTube' are the major online activities that respondents get into.

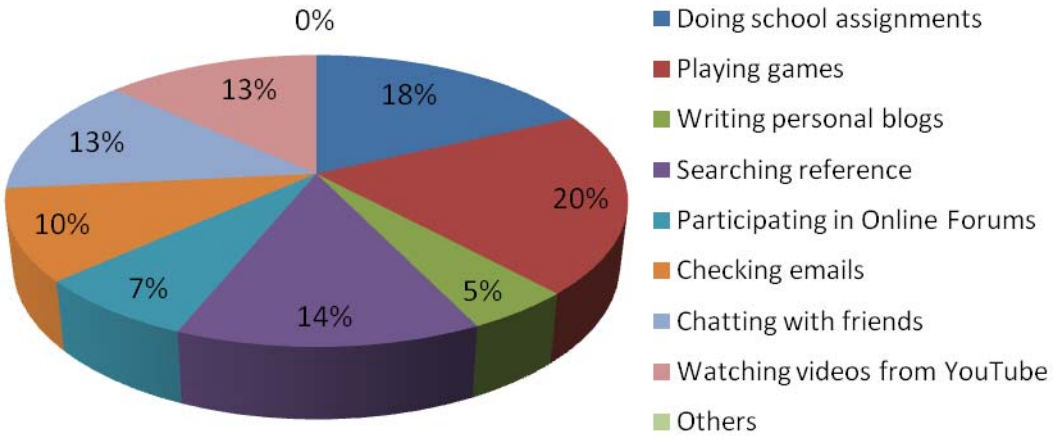


Figure 3: Q3. I get online for……

It implied that internet supports both entertainment and academic activities. The result further erased the worry in using digital library as they are able to use browsing modes and keyword systems.

(3) Reading preferences for print and digital library resources

We also compared children's habits of using print and electronic materials. We asked kids to evaluate their own preferences in using either printed and electronic materials by ratings. The question was 'Q.5 *Do you read electronic materials*

more frequently than printed materials?'

Result:

With an arithmetic mean of 2.96, the majority of respondents have no preference in either reading print or electronic materials. Although this was a self-evaluation and might not accurately reflect their preferences, we may conclude that they are equally likely to be reading both print and electronic materials.

To further investigate their preferences in a greater depth, we selected 6 types of materials which they commonly read, namely, books, supplementary exercises, dictionary, magazines, newspapers and comics.

Result:

Q4. I prefer reading……

	Printed	Electronic
Books	✓	**X**
Supplementary Exercises	**X**	✓
Dictionary	**X**	✓
Magazines	✓	**X**
Newspapers	✓	**X**
Comics	✓	**X**

Primary students prefer reading printed rather than electronic resources. But when it

comes to “tool book”, supplementary exercises and dictionary, which assist them in reading, electronic resources are preferred.

Despite the majority preferring to read printed materials, they also enjoy accessing and retrieving materials online. The majority agreed that they can search electronic document conveniently anytime and anywhere and was able to get suitable electronic document easily. They also agreed with the statement that ‘Reading electronic document is sharable, sociable and interactive’. However, they remained neutral in reading ‘computer screened document’.

Result:

Q.6 What do you think about electronic materials?

	Search electronic document conveniently anytime & anywhere	**Get suitable electronic document easily**	**Prefer to read computer screened document**	**Sharable, sociable & interactive**
Arithmetic Mean	3.5/5	3.4/5	3.1/5	3.4/5

(4) Attitudes towards Digital Libraries

Lastly, to test whether children would read more if there’s a digital library at school, we asked the respondents to rate their attitudes towards digital libraries with the

statement "Q.11 *I would read more if there's a digital library at school.*"

Result:

With an arithmetic mean of 3.4, the majority of respondents agreed that they would read more if there's a digital library at school. In summary, although online materials were used (or read) less often than physical ones, they were considered as valuable tools in the process of searching and retrieving. The ease of use and share can more widely spread the information of favorite books.

Teachers Interview Analysis

So far, we have only looked at perspectives of students, which imply a cautious acceptance of digital library. However, we should not neglect views from teachers who actually administer the reading activities. We, therefore, interviewed 2 English teachers to provide general information as well as their opinions of the acquisition and usage of digital libraries at schools.

As same as the children's view points, these 2 teachers welcome the use of digital libraries as they thought that digital libraries would:

- be a convenient mean for the students to retrieve and read the books;

- solve the storage problems;
- provide the access of a particular book to different students at the same time;
- allow an interactive and independent reading platform with graphics and simulations;
- save teachers' times in preparing reading materials
- allow teachers planning a more comprehensive reading lesson by manipulating the materials from digital libraries instead of typing them out and distribute them to the students

However, both of them expressed several worries in using digital libraries. Their worries include:

- the quality of collections of the libraries;
- the technological equipments provided by schools;
- digital libraries are just extra supplements or resources for the teachers to utilize in class unless they provide a comprehensive set of services, such as interactive teaching approach, so that teachers can save much time thinking of ways to encourage students in reading.

A Concluding Remark

Major Findings
● Near 50% are good readers who read every day or almost every day
● Over 50% are ‘Regular Internet Users’ and near 40% are ‘Heavy Internet Users’
● Majority are equally likely in reading both print and electronic materials
● Majority agree that they would read more if there’s a digital library at school

From the data collected from children and teachers, we can conclude that they welcome the use of digital library and there is a need to have a digital library designed for children in encouraging reading. Therefore, we proceed to PART 2 to design a DL prototype by using a living digital library, website of International Children’s Digital Library (ICDL).

PART 2 Digital Library Prototype Design

Introduction

In Part 1, we have examined the needs of a children's digital library with respect to nowadays reading trends. The literature review, teacher interviews and questionnaire findings showed the evidences that there are needs for the use of a DL in encouraging Hong Kong primary-aged students in English reading. Therefore, in this part, our team will examine the digital library interface design in order to propose a customized user-friendly digital library interface for children. It is very difficult to develop a child-friendly DL without evaluating an existing DL, and there are just few DLs for children as major users on the internet. The International Children's Digital Library (ICDL) was chosen as our starting point to analyze what child-friendly DL should be, and develop our DL prototype through literature reviews, best practice benchmarking, task observation and questionnaire findings.

Literature Review

Part 2 Reading Trend and Challenge – Designing Children's DLs

Weinreich (2000) pointed out that "many new electronic and digital media have to an increasing degree out-competed some printed media other than the book." To cope up with the "Multi-dimensional and multi- modal environments", which have changed children's preferences and reading styles (Kulkarni, 2005), a Digital Library offers "a social environment for collaborative and social practices in multimodal form to fulfill their online literacy needs" (Kulkarni, 2005). It helps "bridge the physical distance between children and libraries" by making many types of books available to them from home or schools (Kaplan and Chisik, 2003). It further provides relatively higher accessibility and flexibility in terms of time and space whereas kids can get materials without actually visiting physical libraries (Bodomo, Lam et al. 2003).

However, when children are the users, developing a digital library appropriate for children is challenging, since young people may have difficulty in reading, typing, spelling, and are continually changing in their interests and abilities (Hourcade & Bederson, 2003).

Digital Library Revolution

Traditional digital libraries cannot provide dynamic environments to the readers. Kulkarni (2005) points out that:

> "majority of current DLs can be called static, which are mainly repositories of conventional-media information, that permits browsing, searching and retrieval of information and so users' experience in DLs is passive and less engaging compared to the Web. Furthermore, many DLs remove social exchange and interaction, focusing narrowly on the technical mechanisms of information access."

It is necessary to build interactive DLs in order to encourage children in using the digital libraries. The digital library interface for children is one major concern. However, "the vast majority of content and interfaces are targeted for adults or older students (Hourcade, Bederson, Druin, Rose, Farber, and Takayama, 2003)." Therefore, children may not be able to use the digital libraries efficiently due to the complex interface designed with adults in mind.

A number of child-friendly digital libraries have been built, which are targeted for children. Recognizing that children have difficulty with spelling, reading, and typing,

“Pejtersen created the BookHouse interface with a metaphor of rooms in a house to support different types of searching. Kulper et al. designed the Bucherschatz interface for children who are eight to ten years old using a treasure-hunt metaphor.” (Hutchinson, Rose, Bederson & Weeks, 2005) International Children’s Digital Library (ICDL) is the one of the most popular DLs for children.

Computing Skills

Another concern is the computing literacy skills of children (Weeks, 2007). Kuhlthau (1993) states that “negative affect such as uncertainty could lead [children] to be less willing to continue interacting with an information system”, as uncertainty could increase the “affective load”, especially when children are lack of coping skills (Nahl, 2004). Therefore, child-friendly technology, which is easy, exciting, and fun for children to use, is very important (Weeks, 2007).

Interface Design

ICDL’s research team conducted research and built up the ICDL interface designed with children. Based on their findings, they developed a category hierarchy of kid-friendly terms and different tools for reading books (Hutchinson, Rose, Bederson & Weeks, 2005). “Children do not think in the same ways as adults, (Bjorklund,

2000)" so children can provide ideas included in the interface design that adults never think of (Scaife & Rogers, 1999). Large, Beheshti, Nesset, and Bowler (2004) support that "children have a lot to offer in the design process as a whole, and that it is advisable to include them in [the interface]." Therefore, during designing a DL, children's participations and opinions are one of the main successful factors (Dania Bilal, 2005).

The DL creators must accommodate technical details such as different operating systems, fonts, colors, feelings, and shapes and file formats (Hutchinson, Rose, Bederson & Weeks, 2005). Children usually remember the physical characteristics of a storybook such as its cover design and color rather than the specific bibliographic information (Weeks, 2007). "It is also true that children frequently choose books based on how attracted they are to the covers. This behavior is evident in bookstores and physical libraries. (Weeks, 2007)"

Therefore, "the visual design of a successful [child-oriented DL] is one with a fun name, colorful backgrounds and foregrounds, large fonts, graphics and animation, recognizable characters, suitable vocabulary, well-laid-out screens, and no advertisements. (Dania Bilal, 2005)" Norman (2004) suggests that the "emotional

design" is a very important component because "attractive things make people feel good, which in turn make them think more creatively." Thus, books can be classified into the feelings category (e.g. happy, scared and sad). Children can find books based on their feelings and thoughts (Dania Bilal, 2005).

Special Features

Although the web, which is a rich information tool, can offer various complex features, children may impose disorientation and information overload (Dania Bilal, 2005). Major determinants in the success or failure of a child-friendly DL are the search & browse instructions and retrieved information displayed (Andrew Large & Jamshid Beheshti, 2005).

Furthermore, a sound DL can provide an "environment for any kind of collaboration and social practices in multimodal form to fulfill their online literacy needs." (Kulkarni, 2005) According to Dania Bilal, (2005), a child's interface should provide 15 features, which allow children to personalize the interface. Also, children should be able to select books based on subjects, ratings, color and shape of the book covers, and feelings in the search area in the digital libraries.

In addition, the rating system is an essential component for children. Kulkarni (2005) introduced the unique feature of ICDL-Sociable Booklist, which "provide[s] opportunity for children to write their own reviews of the books they have read, as well as read other children's reviews. They will be able to rate books." This feature can increase children interests in reading other books through other children's comments.

Besides, allowing children to chat with and get feedback from other readers is an essential feature, so "there will be a place for social interaction such as book clubs or blogs, for seeking and exchanging information. (Kulkarni, 2005)" Social interaction is a good way for earning incentives. Kulkarni (2005) thinks that it can "develop motivation, enthusiasm and trust in children and attract them to be active participants of this domain for reading books, being part of social interaction, as well as entertainment."

A Concluding Remark

As the literature review indicates, digital library is a trend to provide electronic books for children. However, there are very few digital libraries which focus on children users in Hong Kong. Based on the literature review above, some necessary designs

and features, such as big fonts, colorful design, ranking system and feedback feature, are found to assist and encourage children in using digital libraries, but further research should aim to provide more in-depth information on the use of digital libraries to enhance reading interest in Hong Kong. The International Children's Digital Library (ICDL) will be studied in this report in order to further improve the interface to provide the best digital environment for the primary-aged children.

Description of ICDL

ICDL is launched in 2002, and its mission "is to support the world's children in becoming effective members of the global community." (ICDL, n.d.) It is initially created by a research team in the University of Maryland and a group of six children, ages 7 – 11, from the College Park Kidsteam. The researchers and children cooperated together to develop and evaluate child-friendly computer interface technologies. ICDL supports users to search, browse, read and share storybooks in digital form. Its collection concludes about 3826 books in 54 languages, and its visitors come from over 160 countries. (ICDL, 2009) It is one of the most popular children's DLs on the internet.

Structure of the ICDL systems

Each record entry in the bibliographic database systems contains the bibliographic details of a particular document, the details are “a collection of data elements, organized in a logical way, which represent a bibliographic item.” (Chowdhury, 2004) Therefore, the detail records enable users to search documents by authors, titles or subjects. Bibliographic data includes document reference numbers, document types, subject headings or descriptors, full text, abstracts and short references such as titles, authors, and publication dates, etc.

The following table shows the bibliographic structure in ICDL:

ICDL			
Title	✓	Page number	✓
Author	✓	Citation	**X**
Illustrator	✓	Abstract / Summary	✓
Descriptor/ Subject heading	**X**	Full text / Graphic	✓
Document type (e.g. happy, sad)	**X**	ISSN	**X**
Document feature	**X**	Document reference ID	**X**
Publication title	✓	Identifier	✓
Publication city	✓	Source database	✓
Publication date	✓	Text word count	**X**
Language	✓	Source type	**X**

ICDL organizes and presents all the bibliographic data in a set format for each record entry after clicking the books in the search result pages. Figure 4 below shows the structure of the record entries with all bibliographic data included:

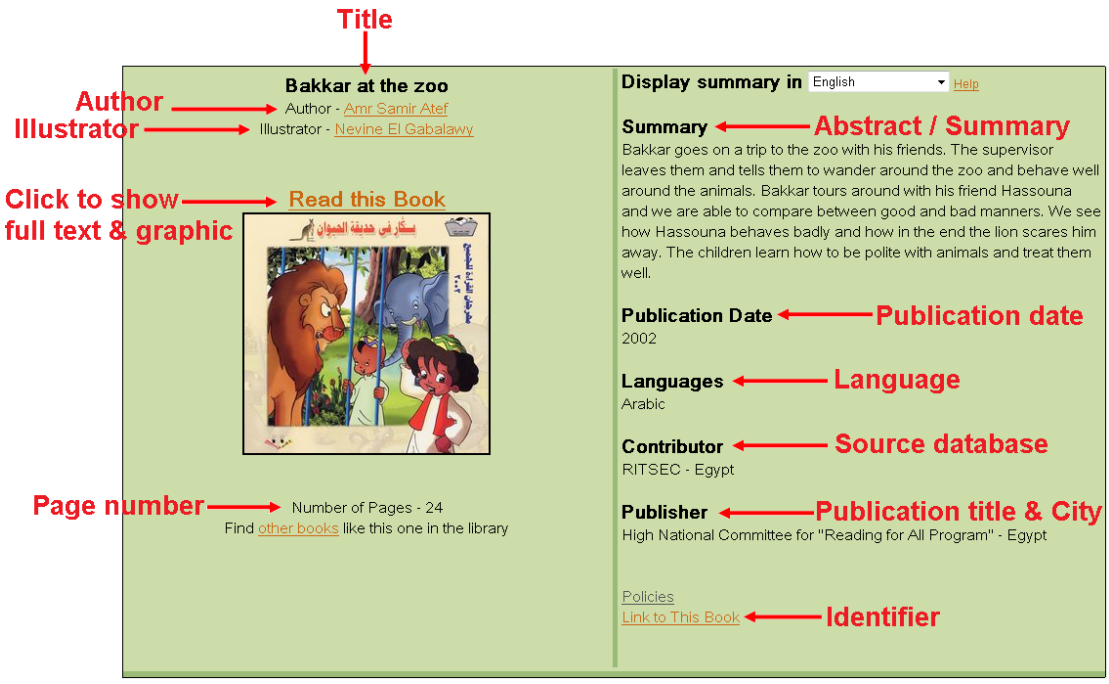


Figure 4: Bibliographic data in each record entry

ICDL can organize and display more important bibliographic data, such as document type / emotional type (e.g. happy, sad) and text word count, and this data can facilitate the "search result" or "suggestions to search more similar books". This will be explained in more detail in the section on the Part *User-interface design issues of ICDL – Phase 3: Review of result.*

User-interface design issues of ICDL

A good user interface design is one of the essential components in a sound digital library. There are 2 main functions of the user interface forms, according to Chowdhury (2004):

"they allow users to search or browse an information collection and

> they display the results of a search. They also often allow users to perform further tasks, like sorting, saving and/or printing the search results, modifying the search query, and so on."

In this part, a four-phase framework for interface design by Shneiderman, Byrd and Croft (1998) is used. The phrases are formulation, action, review of result and refinement. These are applied to analyze the designs of ICDL in the below table:

ICDL	
Phase 1: Formulation	OK, and it can be improved.
Phase 2: Action	OK, and it can be improved.
Phase 3: Review of result	Good
Phase 4: Refinement	OK, and it can be improved.

Phase 1: Formulation

Selection of resources is very important for users to retrieve relevant materials. A large collection always has more than one database, which contain different types and subjects of resources. The user interface designs should provide users some ideas and descriptions of each database in the collection.

Although ICDL does not release much information about what is contained in the ICDL database, ICDL does allow users to search in certain specific areas such as by cover colors, languages, age groups, book sizes and rating, these important functions are all provided in the main / simple search page.

However, the simple search page is divided into 2 pages, so users, especially the

novice users, may not easily notice the second page *(Figure 5)*. It is, therefore, not a perfectly user-friendly design.

Figure 5: the second simple search page

Phase 2: Action

Shneiderman, Byrd and Croft (1998) believe that a good user-interface design can indicate to users that their searches are being processed with the progress indicator. A better method is “dynamic queries”, which means no search button is provided in the user-interface, and the search result set is displayed and updated constantly when the search queries and items are changed. (Chowdhury, 2004)

Although ICDL does not support the “dynamic queries” information searching

method, it provides a static search process indicator after clicking the search button *(Figure 6)*. The indicator will show and load when the server run the search query and deliver the information. After the information is ready, the next page will display all the relevant books immediately. This design can tell users that the database is running and not out of service. However, this indicator is only assigned to viewing books and simple search pages, but not to other activities such as advanced search page.

Figure 6: Static search process indicator

Phase 3: Review of result

Many databases offer a variety of choices for users to view the search result documents. For instance, the users can choose:

- the document formats,
- research result sequence,
- number of result display items in each page,

- types of result display items, and
- open search result windows, etc.

The following table shows the viewing result choices of ICDL:

ICDL	
Document display formats	Jpeg graphic file, Java file, text
No. of result display items in each page	Only 8, 12, 24 or 36 result items in each page
Display certain book Types of result items	Only one type – English story books
Open search result book windows	**X** Cannot choose open in original or new windows
Research result sequence	Sort results by authors, languages, titles, illustrators and publication dates.
Interface languages	16 languages
Text only interface	✓ (with smaller book cover pictures)
Helpful Messages to explain search results	✓ ◆ Book languages
Language translations	**X**
Suggestions to search more similar books	✓
Search response time	**X**
Visualization techniques	**X**

More addition helpful messages can be added in ICDL, for example, a bar (number of stars) shows the degree ranking of each search result items, it helps users to recognize the relative ranking of the books to the search queries.

Although there are few comments from children in some storybooks, not every user can give reviews. It decreases the interactions among the children and other users.

Phase 4: Refinement

It is very common for the information retrieval systems to provide refinement function to modify or refine the search queries. In some systems, the users can refine the queries to conduct a new search based on the existing or recent retrieved set of results. ICDL provides this refinement function in the search query. However, it does not provide the facility to temporarily store recent search queries by the users.

Best Practice Benchmarking of ICDL, Baldwin Library of Children's Literature Digital Collection and Longman English Reading Website

In order to find out the best practice of children's DLs, a study has been done to evaluate the differences between ICDL, Baldwin Library of Children's Literature Digital Collection (BLCLDC) and Longman English Reading Website (LERW).

BLCLDC is selected because there are no other comprehensive DLs for children to read English books like BLCLDC and ICDL as we observed from the period of early 2009. Furthermore, BLCLDC is one of the contributors to the International Children's

Digital Library to provide English reading books, so it is a good idea to select BLCLDC as the best practice. They share some common characteristics, which are providing children's English books, and contain information retrieval systems.

LERW is selected because Pearson is our project partner. Although LERW is not a digital library, it is good to analyze its digital book collection in order to evaluate whether Pearson has a comprehensive information retrieval system with which to develop a digital library.

Description of DLCLDC & LERW

DLCLDC "makes accessible a collection of over 4,500 fully digitized children's books published from 1850 to 1900 in the US and UK." (OHIO University, n.d.) There are many English and American editions of the same work in its collection. (UFDC, 2008) According to its website, "the Baldwin Library of Historical Children's Literature is a contributor to the International Children's Digital Library and a founding partner of The Center for Children's Literature and Culture at the University of Florida."

LERW is an e-commerce website, which mainly sells English related materials for

primary students. The collection has over 500 items. It aims to be “bringing you a whole kingdom of reading for children.” (Pearson Education, 2009)

Usability study: Heuristic Evaluation

There are many methods to evaluate the usability of the information retrieval systems. Heuristic evaluation is selected in this report. “Heuristic evaluation is a usability engineering method for finding the usability problems in a user interface design so that they can be attended to as part of an iterative design process.” (Nielsen, 2005) 10 Usability Heuristics are used to identify the usability of both ICDL and DLCLDC, and the following table simplifies the detail:

	ICDL's disadvantages	**DLCLDC's disadvantages**	**LERW's disadvantages**
Visibility of System Status	Discuss in *User-interface design issues of ICDL: Phase 2 – Action*	◆ Indicators like "loading" or "please wait" should be provided when performing search queries.	◆ Indicators like "loading" or "please wait" should be provided when performing search queries.
Match between System and the Real World	◆ Java required for other book viewers ◆ No ascending date sorting ◆ No sub-collections to be selected ◆ More search result display views needed e.g. Brief view & Full view ◆ No search function to search text for a particular book ◆ "Advanced search" and "Search By Collections"	◆ Only English language in the user-interface ◆ More search result sequence methods needed ◆ "Zoomable" function does not work	◆ Only English language in the user-interface ◆ No search result sequence methods ◆ No other search result display views
User Control and Freedom	◆ "Back to Top" button is needed ◆ "Jump to the last page" button & "Jump to the first page" are needed ◆ Result page number bar is needed *(Figure 7)* ◆ Cannot redirect back to result page after selecting a book	◆ No number of result display items in each page to be selected ◆ "Back to Top" button is needed ◆ Result page number bar is needed *(Figure 8 & 9)* ◆ Cannot redirect back to result page after selecting a book ◆ Can only display maximum 999 results per search	◆ "Back to Top" button is needed ◆ No number of result display items in each page to be selected

Consistency and Standards	Good	◆ Inconsistent “Children’s Literature” buttons	◆ Good
Error Prevention	◆ No suggested correct spelling function	◆ No suggested correct spelling function	◆ No suggested correct spelling function
Recognition rather than Recall	◆ No recent search queries and result history saved	◆ No recent search queries and result history saved ◆ No bookmark features	◆ No recent search queries and result history saved ◆ No bookmark features ◆ No refine function for previous search query
Flexibility and Efficiency of Use	OK with Boolean support	Good with Boolean and Phrase searching support	◆ No search technique supports
Aesthetic and Minimalist Design	Better	OK	OK
Help users recognize, diagnose, and recover from errors	Good	Good	Good
Help and documentation	Good	Good	No FAQs or Help sections

1. **Visibility of System Status**

Compared to DLCLDC and LERW, ICDL is the only one that provides the "loading" indicator in the DL. However, the programming is inconsistent, as it does not utilize this function in the entire website. For instance, the advanced search page does not provide the "loading" indicator. The users cannot know how long they should wait, and do not know whether the link is dead.

2. **Match between System and the Real World**

All of the retrieval systems selected need to offer more search result sorting options and result display methods to provide convenient interfaces for the users. ICDL provides "Advanced Search" and "Search By Collections" functions, but they are actually the same search page. The children may get confused about the differences.

On the other hand, one good feature provided by DLCLDC is "Search This Document" function when viewing a book. The users can even search particular words within the book's full text.

3. **User Control and Freedom**

It is an absolute must to provide, “back to top” and “jump to the first / last page” buttons. Only LERW provides the “result page number bar” *(Figure 7)*, which is very important when the result numbers are over hundreds. The users can freely select the middle of results.

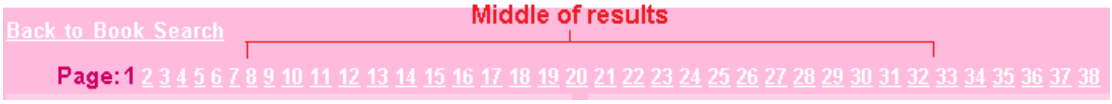


Figure 7: Result page number bar in LERW

LERW can also redirect the users to previous result page after selecting a book. Whereas, ICDL and DLCLDC can only redirect the users to the first result page after clicking a book, that is not convenient.

4. Consistency and Standards

DLCLDC cannot fulfill this principle. When the users execute the “Search This Document” function and then read the book content, the “Children’s Literature” button will disappear *(Figure 8 and 9)*. This button is very important as it is the only one button to redirect the users back to the DLCLDC. Other button will redirect the users to the “University of Florida Digital Collections”.

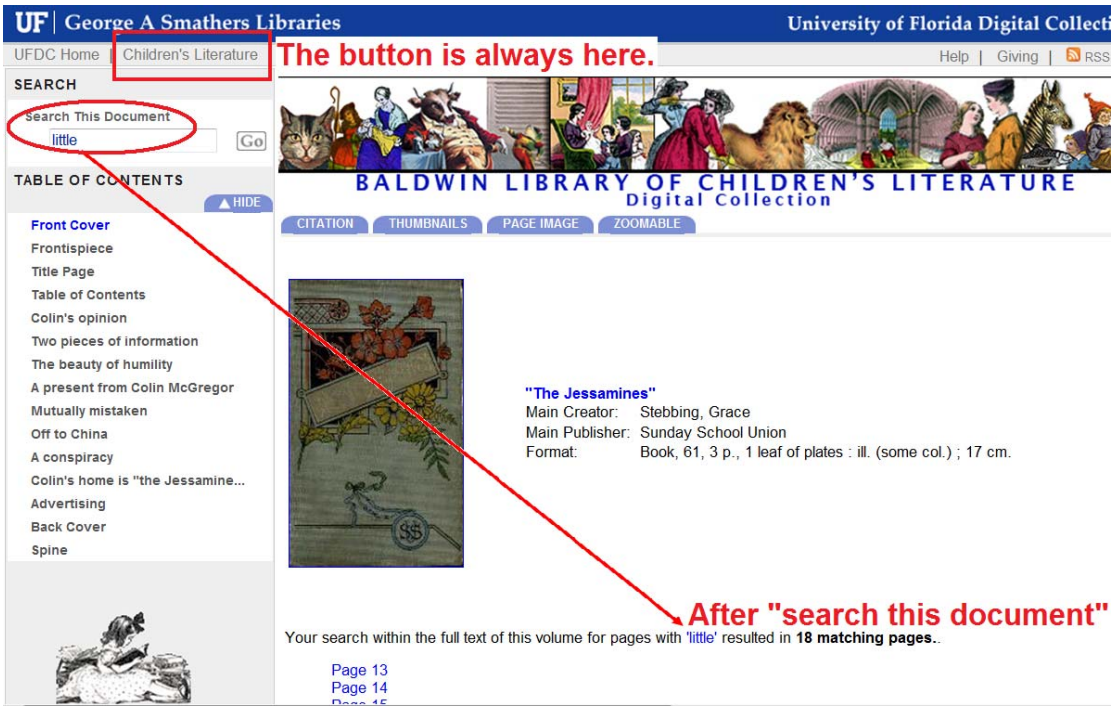


Figure 8: Search result from the "Search This Document" function page

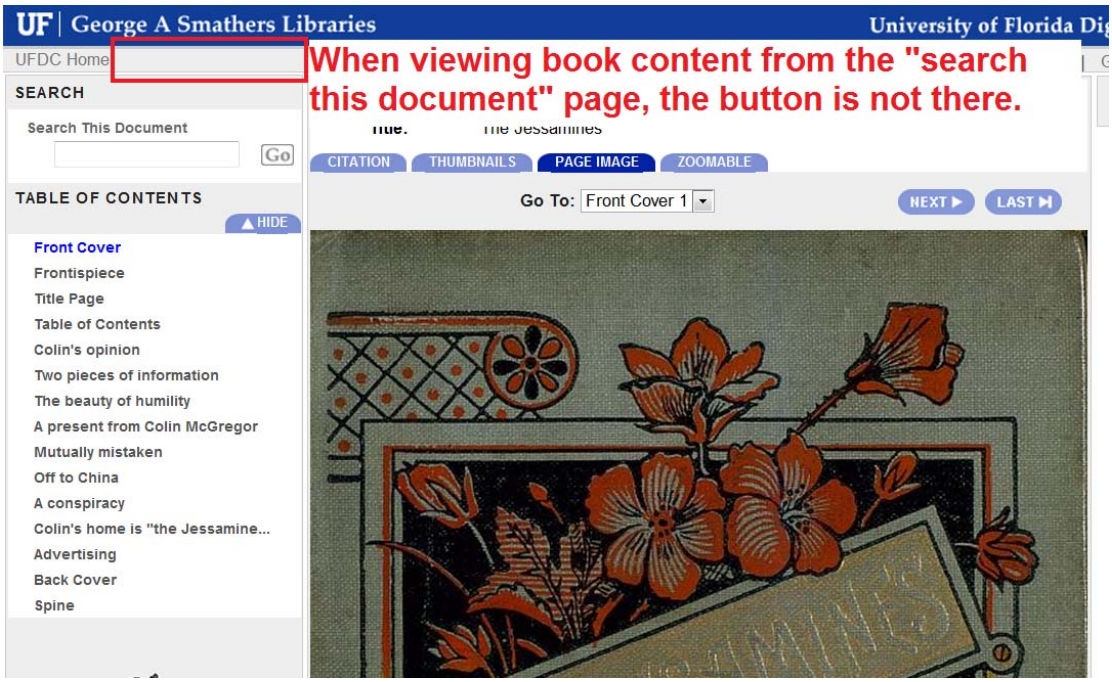


Figure 9: Reading content after the search result

5. Error Prevention

All the information retrieval systems should provide suggested spelling functions to prevent typographical errors.

6. Recognition rather than Recall

The latest recent search query history is provided in ICDL and DLCLDC. Users can only load back the previous search results but do not have the ability to load back anything before. They have to recall search strategies themselves and perform “New Search” if they want to refine other previous search queries. LERW is even less helpful in that as it does not provide any search refining function and last search query history.

On the other hand, ICDL provides bookmark feature, so the users can bookmark certain records and do not have to memorize them.

7. Flexibility and Efficiency of Use

ICDL and DLCLDC provide basic search techniques, other search techniques such as proximity and truncation are not available because children are not equipped with these advance search skills. However, LERW does not even provide the basic search techniques such as Boolean and Phrase searching supports.

8. Aesthetic and Minimalist Design

ICDL is designed very well in term of the use of font size, font color, and different heading sizes, which are both eye catching and helpful to the user in understanding what they are reading

9. Help users recognize, diagnose, and recover from errors

If there is no search result found for the search query, all of the selected retrieval systems will provide suggested relevant search try or search tips to the users.

10. Help and documentation

“Help” is to teach users how to search, browse, retrieve and even save data. It is beneficial to the users that ICDL and DLCLDC have the “Help” options, and the explanations in both systems are detailed with some graphics. However, LERW has neither Help section nor FAQs.

Based on the 10 Usability Heuristic evaluation analyses, these three systems have their own individual advantages and disadvantages, and there is still room for improvement in various areas as mentioned in the above analysis. In order to have more information from the children’s point of view, further research was conducted.

Research Methodology

Research Question

As mentioned in Part 1, the second research question is:

What are the elements (e.g. function and design) of a digital library and digital resources that encourage reading by primary-aged children?

Therefore, questionnaire and task observation were applied to study this research question.

Sampling Size

2 students, aged 9 and 10, participated in the task observations. Also, as mentioned, 82 students in P4 – P6 participated in the questionnaire survey.

Questionnaire Survey

Please refer to PART 1: *Research Methodology – Questionnaire Survey*

Task Observations

Since the target interviewees are primary-aged children, observations play a significant role in helping to learn more about how children interact with the DLs. The “user and task observation” and “simplified think aloud” techniques were applied in the observations (Appendix 2). The focus of the observations is to understand

how the use of the digital libraries can enhance the children's interest in reading. The 2 children were required to:

1. Follow a set of steps to complete designed tasks. They needed to think aloud while working on the tasks, and then gave ratings on 9 items of the ICDL's system;
2. Search for personal interests through the ICDL and think aloud for 15 minutes, and then answer 6 simple questions.

Since ICDL has many components that a user may face with, the 2 participants could be targeted to focus on the "simple search", "keyword search", "book viewers" and "bookmark" areas by the "user and task observation" method for observation. Furthermore, think aloud (speak out their thoughts) "provides the added benefit for [us] to learn a little more about the thought process behind using the interface and can be identify problems needing to be fixed. (Ochoa & Wooldridge, n.d.)" When the 2 participants completed the tasks, they were asked some questions on various things regarding the observations.

The tasks, ratings and simple questions about the DL are aimed at testing the following:

1. Ease of use of the system such that the user can quickly begin using it.
2. Improvement of the system regarding its design.

The researcher provided help only when the participants reached a roadblock and testing for the specific task was halted. Also, a pilot test (Appendix 3) for task observation was conducted with a 10 years old boy before operating the actual observation.

Data Evaluation Methodology

Please refer to PART 1: *Research Methodology – Data Evaluation Methodology*.

Data Analysis for PART 2

To present the findings, we first extracted results from questionnaire survey (Part 2 and Part 3) to figure out the respondents' comment towards the interface design and preferred search options by using the living ICDL as a starting point. Other functions, which were considered useful, were also explored from the survey. Accordingly, the ability of children in conducting a search query provided by ICDL was tested in by in-depth observations of 2 respondents. Other notes were also gathered during the observations to learn how children interact with the ICDL interface.

Questionnaire Analysis

These findings are presented according to children's preference towards (1) ICDL Interface Design, (2) ICDL Search options; and their suggestions of (3) Digital Library functions.

(1) Interface Design

First, we asked respondents to rate the ICDL interface as we want to test children's fondness in using the ICDL interface with the statement *"Q.7 the ICDL provides an easy and user friendly interface."*

Results:

With an arithmetic mean of 3.31, we can conclude that the majority of respondents have positive impression of ICDL interface. Thus, we may precede using ICDL interface as a foundation in building our prototype.

(2) Search options

As recognized that children prefer to read what they like, we intend to develop an easy and child-friendly search options which allow them to access and retrieve their favorite choices. We asked respondents which features they had used in the pre-survey activity and then rate the features they chose. Since children were free to choose which search options to use in the pre-survey activity, their choices may reflect their unintentional search choices.

Results

Out of 9 search options provided by ICDL, 80 out of 82 eligible respondents ‘unconsciously’ conducted their search by selecting the search options of ‘Find Books’, ‘Keyword search’, ‘Full Book List’ and ‘Feature Books’ and rated ‘high value’ accordingly, we may conclude that these 4 search options highlighted as children’s frequent search selections. And we should further investigate these 4 search options in observations.

(3) Digital Library functions

In order to make our customized DL prototype more interactive, we provided choices of features for respondents to choose from. Their top 5 preferred choices are considered valuable in building our customized DL prototype.

Results

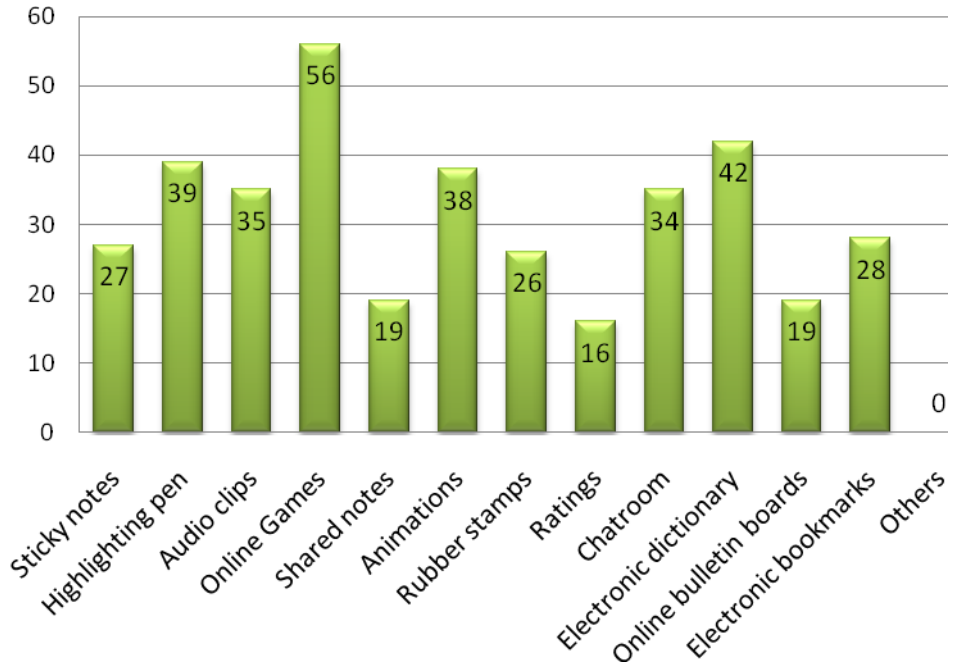


Figure 10: Q10. I would read more if a digital library consists of features, such as.…..

Out of 12 features we provided in the questionnaire, 'Online Games', 'highlighting pen', 'Electronic dictionary', 'Animations' and 'Audio clips' are considered valuable for a children's DL. Therefore, we would add these functions in building our prototype. Complete questionnaire data is in Appendix 6.

Task Observations with Suggestions

Using ICDL as a starting point, the final design of our prototype was built according to a redesign of ICDL home page with an emphasis on the most used areas and creating a simpler, less cluttered look. Based on the 4 preferred options that children selected from the questionnaire, we only studied ‘simple search’ and ‘keyword search’ from the observations in order to test the ability of conducting a search. Other comments were also gathered during the observations to learn how children interact with the ICDL interface.

Visual display and screen design— Use of color/ graphics/ pictures

The first tasks evaluated the effect of the front-page objects by asking participants to identify the actionable search buttons in ICDL before conducting a search.

Observations

- Both participants noticed objects with color and images. However, both of them mistakenly clicked on the displayed books as search buttons at the first glance *(Figure 11)*. They had problems finding link to the library’s catalog and one was not proficient in English. Both of them needed help from the researcher in figuring out the search tools.

Figure 11: Participants were unable to identify search tools

- Both participants commented that they liked the ICDL home page design. But they wanted to add more colorful graphics and thought it looked cluttered with so many texts.

  They commented that “I don’t like the green color background as it looks dull”, and

  “More colorful buttons should be added. I don’t like reading words.”

Response and Suggestions

- Because the main navigational links were not obvious to the user, the main search button would be enlarged. Color, graphics and placement can be used for emphasis while the buckets can be used for further and temporary information i.e.

Book News, Library News, etc.

- Background color would be changed in blue.

Finding ICDL Catalog—Simple Search

Participants were asked to use simple search to find an eleven, pink color and short book titled “Margaret Mahy”.

Observations

- Both respondents recognized the *color* buttons at the first glance. However, they were unable to find the pink color one, which was shown in a different page, as they cannot discover the *More Choices* button at the top right corner [It was mentioned in *PART 2: User-interface design issues of ICDL—Phase 1:Formulation*]. They chose *Rainbow Covers* or *Red Covers* instead for finding the pink cover book *(Figure 12).*

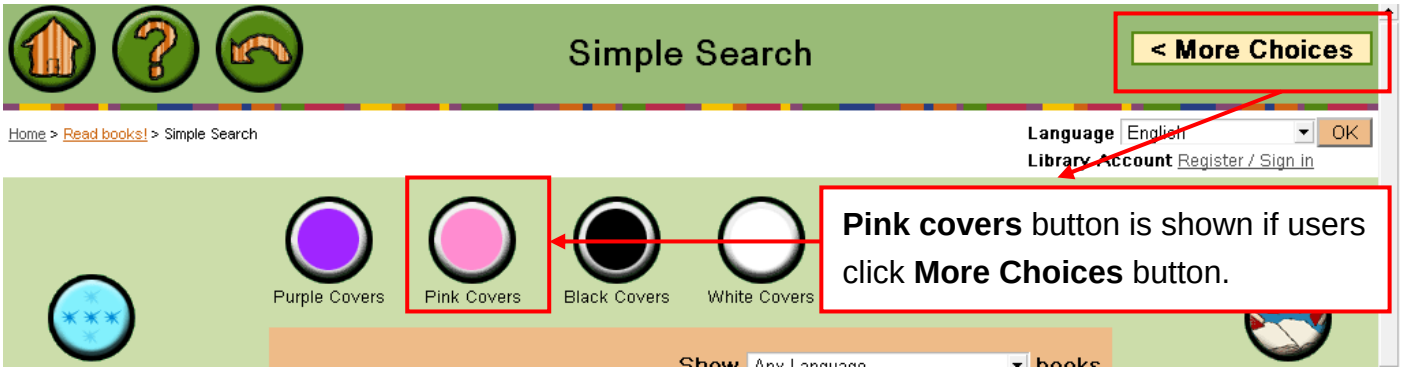


Figure 12: Participants were unable to find out Pink covers button

- Both respondents ignored to use the *Ages* and *book-length* buttons to narrow down their search *(Figure 13)*. As the website would automatically load with one click of button. After they clicked the selected *color* button, they thought that the search results were already displayed as the page was already showing the *static search progress indicator (Figure 14) [It was also mentioned in PART 2 User-interface design issues of ICDL—Phase 2: Action]* with one click of button. Thus, they stop searching and looked for the book from the search results. As one of them commented that:

  > "Simple Search is quite difficult to use… as there are many buttons shown at the search page, I am frustrated to choose which of them steps by steps."

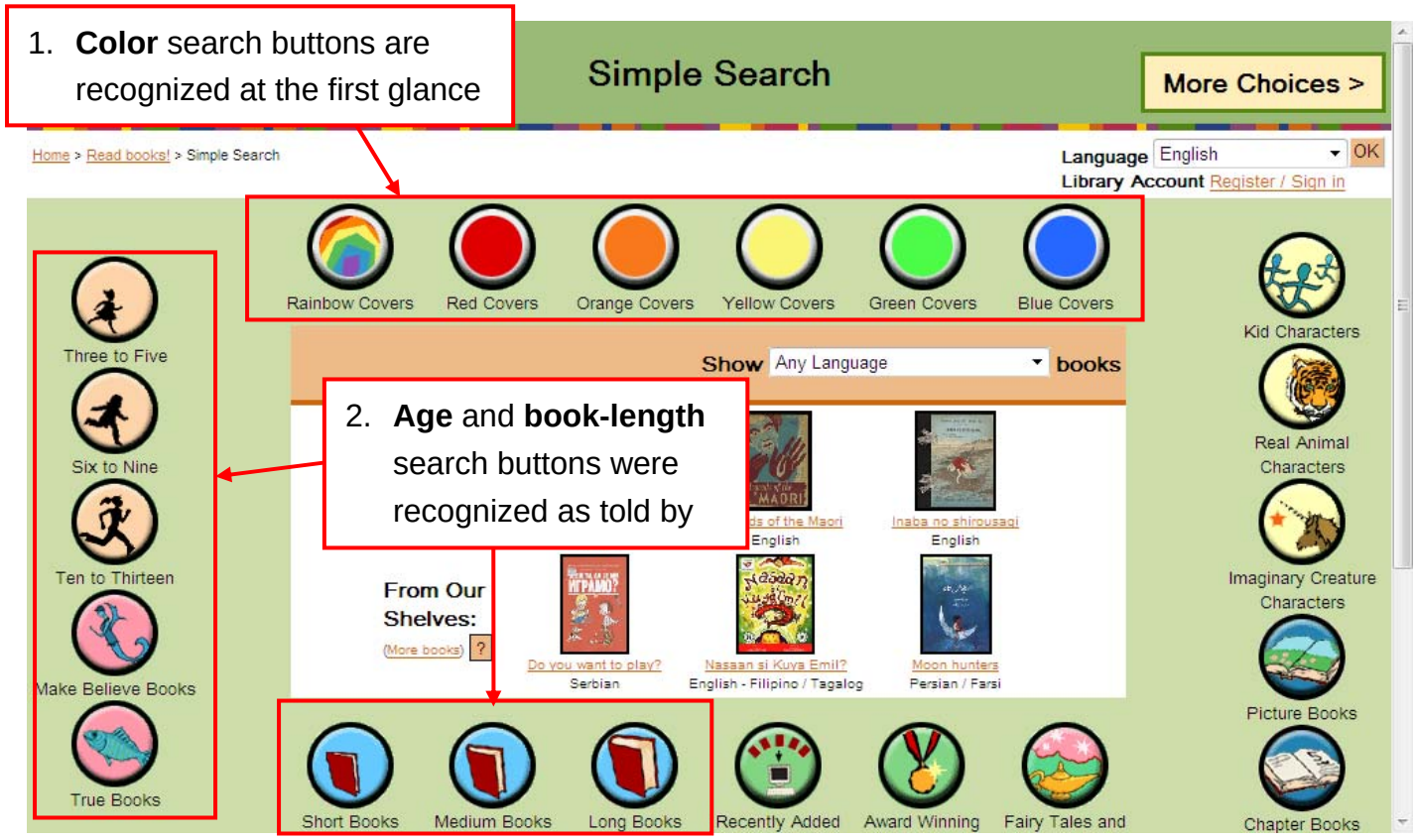


Figure 13: Color/Age/Book-length buttons

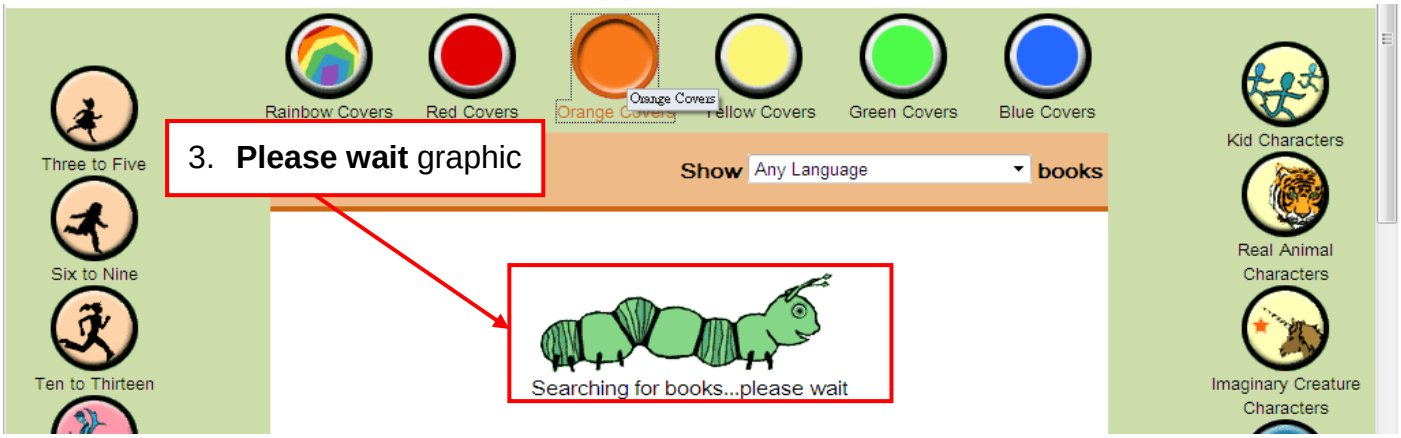


Figure 14: Static Search Progress Indicator

- Both respondents did well in refining their searches by using the *Back* or *Start Over* buttons. However, they ignored the display of their search sequence commanded, which would also help refine their search *(Figure 15)*.

Figure 15: Search refining buttons

Response and Suggestions

- Since both participants didn't agree that ICDL provided a logical search sequence, we will lessen the search query choices in the Simple Search page and

group the most preferred search buttons, namely, emotional buttons, color buttons, rating buttons, book-length buttons, in one page.

- The buttons for refining search will be kept in conducting search queries
- ICDL automatically displays results without clicking a ‘search’ button that frustrated users to view the result pages. We will add a ‘search’ button in the Simple Search page and a loading indicator will be shown only after users click the button.

Finding ICDL Catalog—Keyword Search

The participants were asked to use keyword search to find the book titled “Margaret Mahy”, and after that, they were asked to use either simple or keyword search to find a book according to their own preference.

Observations

- Both respondents cannot find the navigation link for simple search as mentioned. One commented that:

  “I’m used to using a search box to type in words at the front page”.

- Both respondents had no problem in typing the given book title, “Margaret

Mahy". However, when they were allowed to choose according to their own preference, they preferred to use Simple Search because they were not keen on spelling and typing words. One commented that:

> "I don't know what to type in the searching box as I like books with blue covers."

Response and Suggestions

- An enlarged keyword search box, with an artificial intelligence spelling function suggested, would be displayed in the front page.

Other Comments and Suggestions

Upon the tasks completion, participants were asked to comment on what they liked or dislikes about the site, and if they had suggestions or comments. This section provided some insight into the reactions of the participants about elements not covered during the tasks: the following is a summary of these comments and suggestions.

Are there any suggestions for improvement about the site?

Both participants said that they liked to use ICDL as they can search numerous and

interesting books with one click. And they agreed with the convenience of reading books online. They had made the following suggestions:

- **Use of color/graphics/pictures**— More graphics and more attractive colors for background should be used.
- **Search options**— Major search buttons should be displayed on the simple search page as "I liked searching books with the color buttons, checking books with high ratings and signs of emotions.'
- **Book viewing**—Bookmark was considered valuable as 'I love using Bookmark…just like I am having my own library in the site' and 'I liked the Zoom in and out button because I see texts and pictures more clearly.'

They had also made the following suggestions for the site to facilitate their reading progress:

- Animations should be added to make the site more interactive
- Audio clips should be added as 'just like I am listening to a story'
- Electronic Dictionary should be added as 'I can check words immediately'
- Tools of highlighting and sticky notes should be added as 'I can trace my last read page and I like leaving comments'

Final Design for the DL Prototype

With reference to the research findings, we have the following suggestions for the final prototype design.

Homepage Design. Unlike ICDL, we have used lesser words. Important wordings are shown with an emphasis on the most used areas and creating a simpler, less cluttered look. Buckets are used for further and temporary information i.e. Help, Contacts, etc. Figure 16 shows the details.

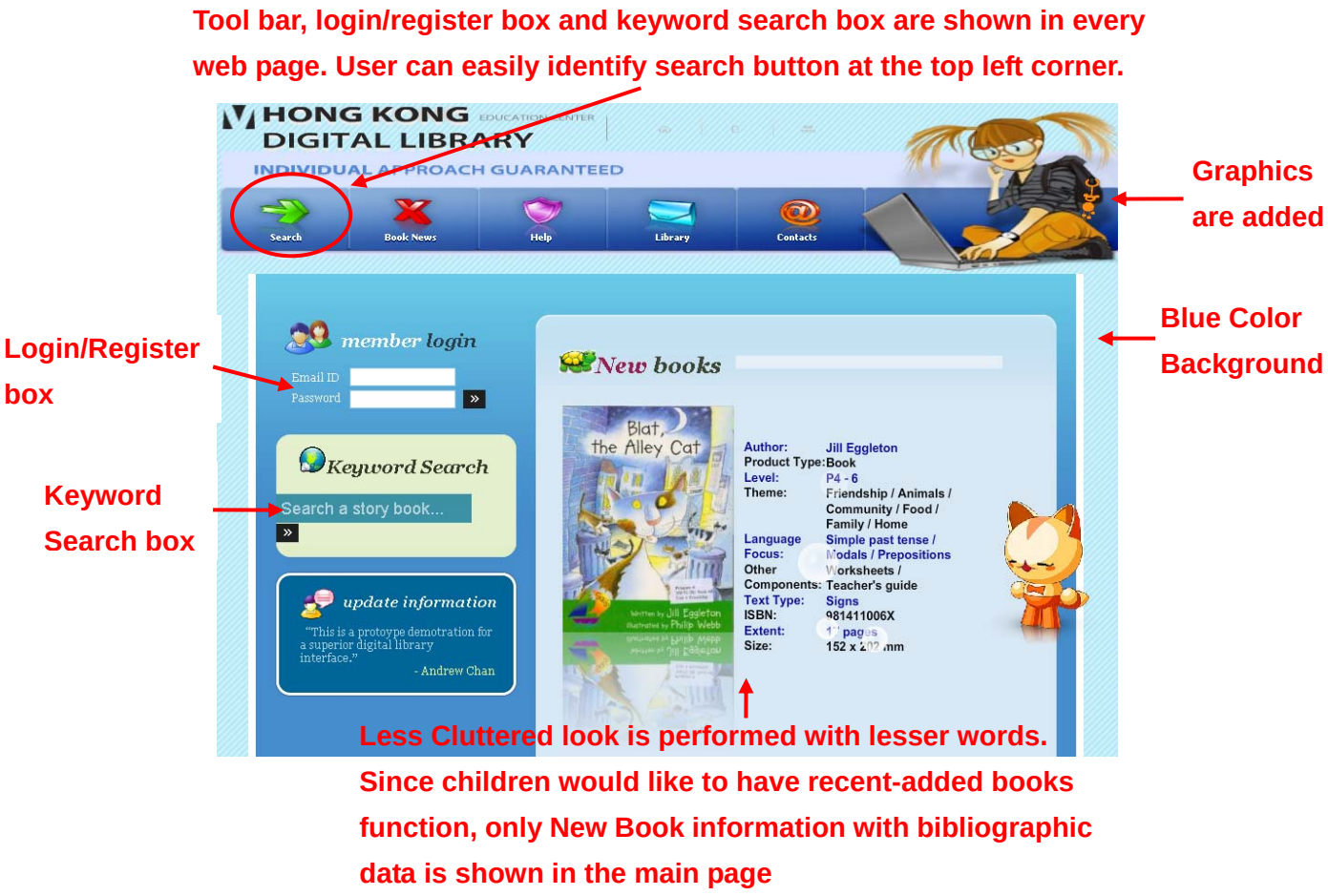


Figure 16: Homepage Design

Search options. Unlike ICDL which offers 9 types of search options, our prototype

provides 4 popular searches as discovered in our findings. They are keyword search, simple search, full book list and feature books *(Figure 17)*.

Figure 17: Search options

Keyword Search. The keyword search box is shown in every web page in order to allow users conducting a new search while browsing (*Figure 18)*.

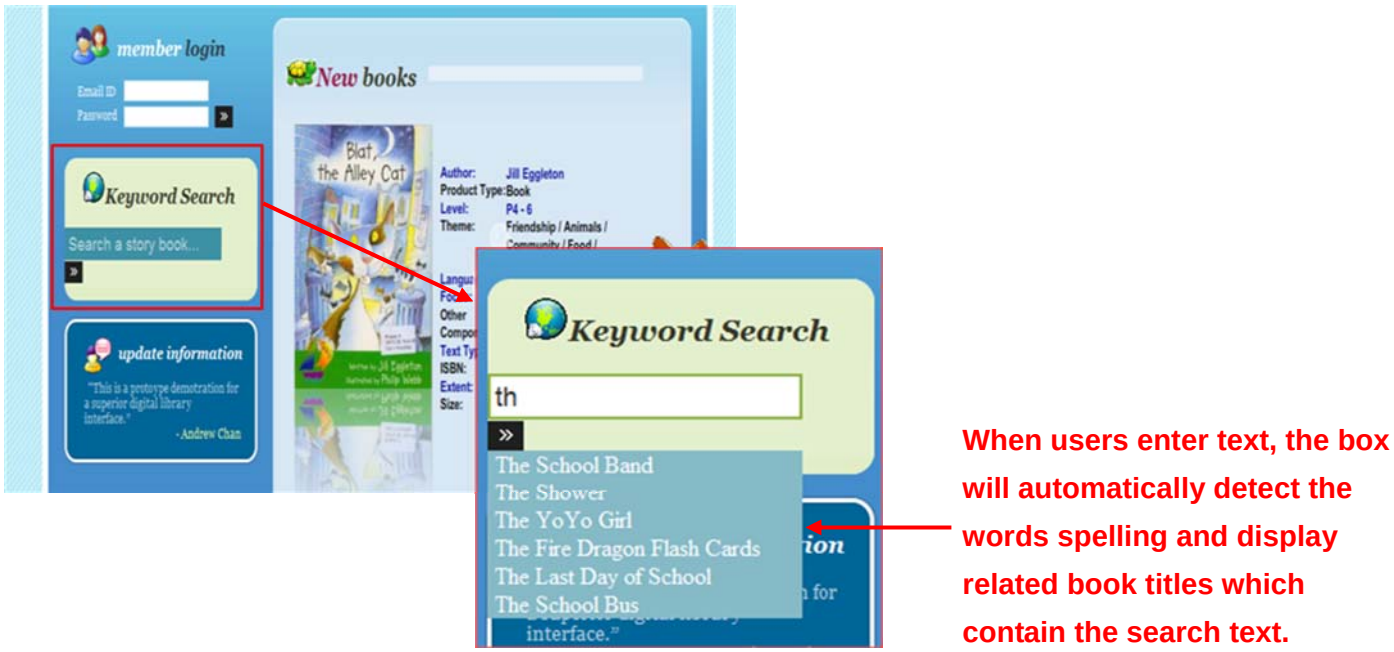
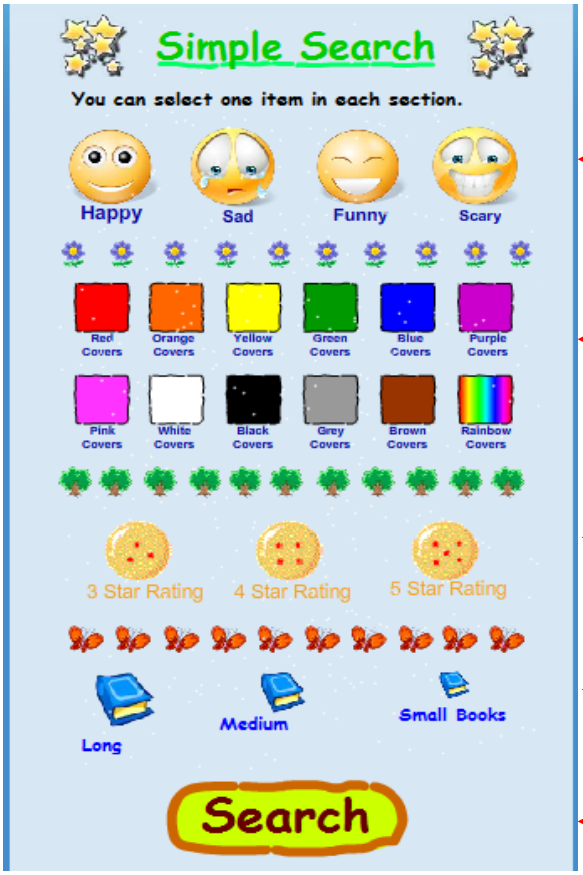


Figure 18: Keyword Search

Simple Search. Simple search offers 4 types of search categories that are most used

from the observations *(Figure 19)*. After choosing preferred options from each category, search result will only be loaded by clicking the search button. Users will not be frustrated in conducting their search by following the steps which are clearly indicated.



1. **Emotion option**
   For example, if 'scary' is chosen, scary books are displayed.
2. **Book covers option**
   For example, if 'Red Covers' is chosen, books with red covers are displayed.
3. **Ratings option**
   For example, if '4 Star Rating' is chosen, books rated as 4 stars are displayed.
4. **Book length option**
   For example, if 'Long' is chosen, books with more than 20 pages are displayed.
5. **Users have to click the 'Search' button to load the results.**

Figure 19: Simple Search

Search Results. List of results is displayed *(Figure 20)*. Book covers and some bibliographic data, which is supposed to be understandable by children, are shown. We offer 30 (6x5) result sorting methods and 4 types of result viewing methods in order to allow the children to personalize the interface by these features.

Reading Books. In the book viewer *(Figure 22)*, it shows the dynamic loader when the book pages are loading. Furthermore, 3 book reading options are offered *(Figure 21)*, which are default screen view, full screen view and slideshow. Additionally, an audio button, electronic dictionary and highlighting pen are provided to facilitate users' reading progress.

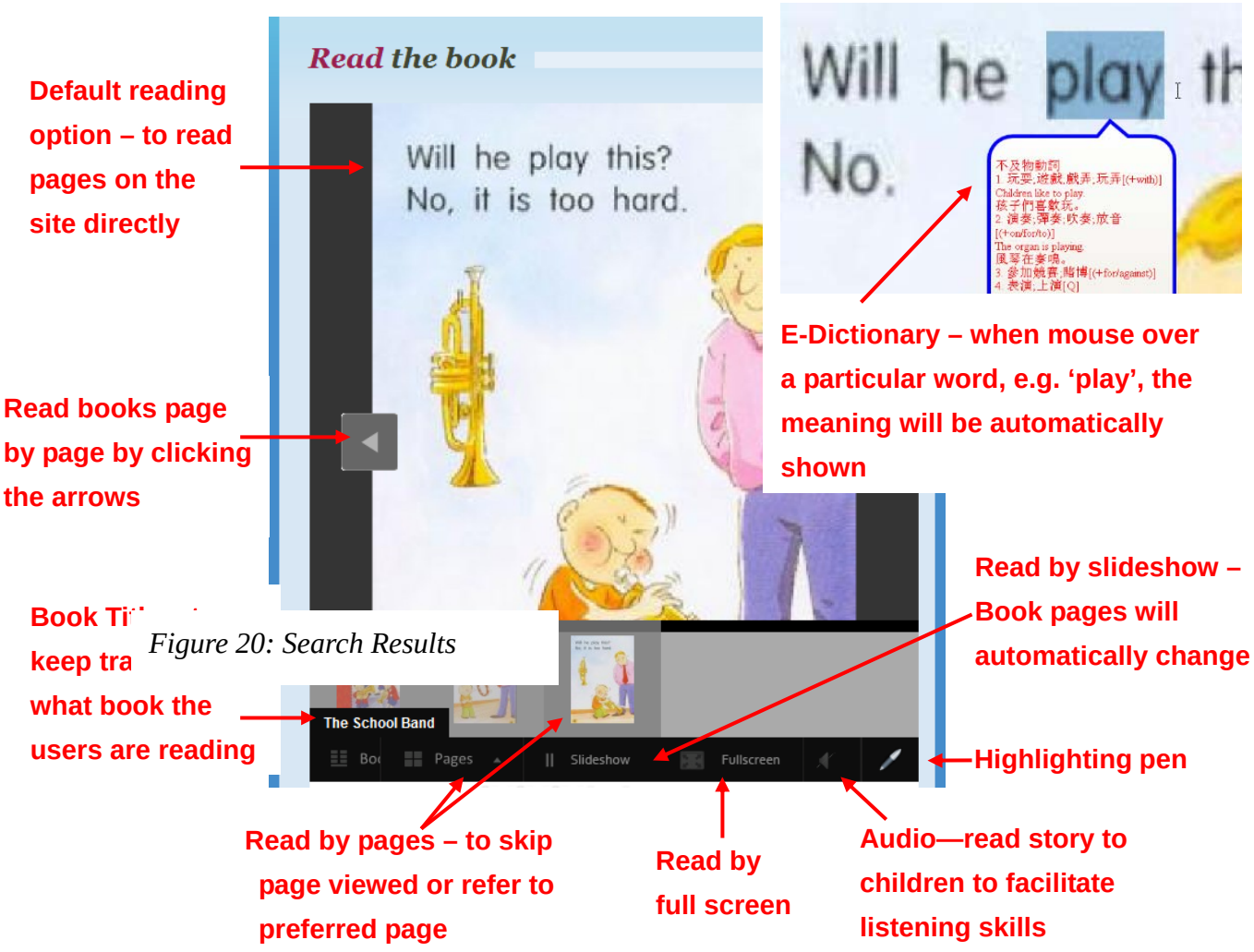


Figure 20: Search Results

Figure 21: Reading Books

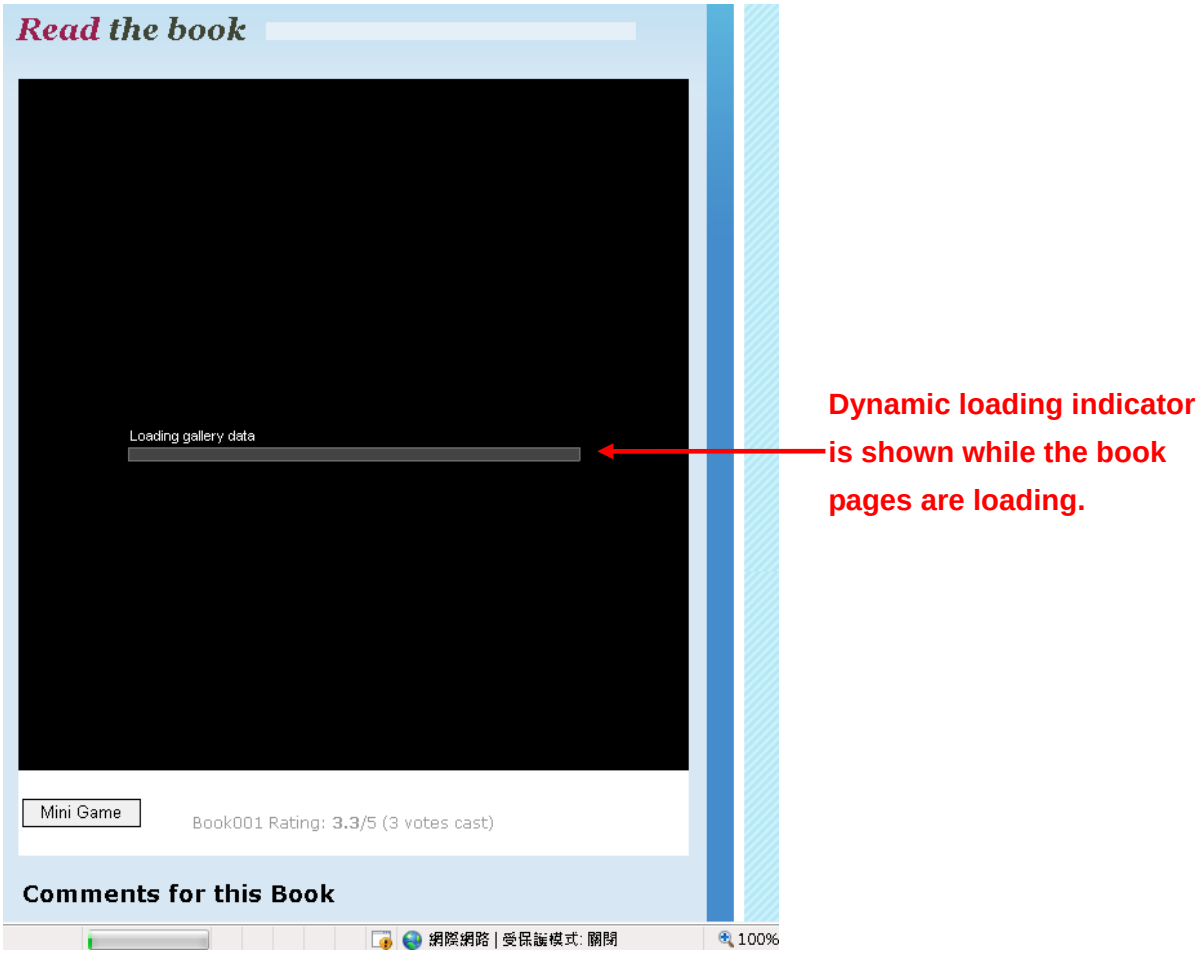


Figure 22: Dynamic loading Indicator

Other Features. Apart from audio, dictionary and highlighting pen, our prototype also includes other features that facilitate reading progress and stimulate children to read. They are sticky notes *(Figure 23)*, mini games *(Figure 24)*, book ratings *(Figure 25)* and commenting *(Figure 26)*, which make our prototype more interactive for children.

Sticky Note is provided for users to leave a note. It will be automatically saved on that page and database, and users can review it if they read that book next time. It functions like bookmark.

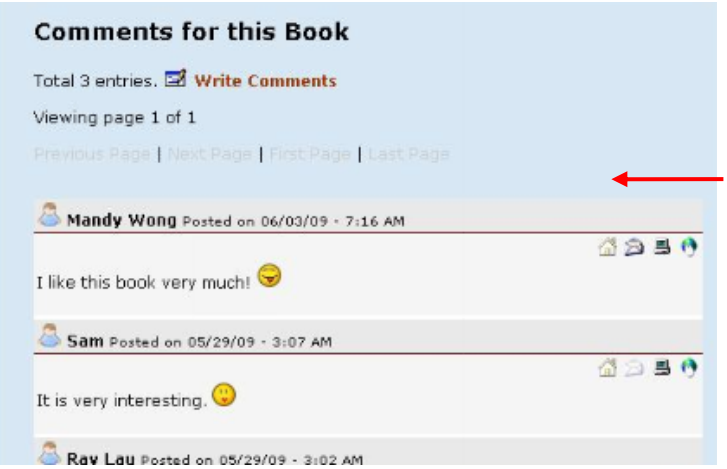
Figure 23: Sticky Note

Book Ratings is suggested for users to rate the book read. The ratings are automatically saved in the database.

Figure 24: Book Ratings

Mini game is provided to keep children's interests in reading

Figure 25: Mini Game



Comment feature is added for users to leave comments for the book read as children love reading comments from others and writing comments for others.

Figure 26: Comment feature

Prototype Demonstration

Please refer the attached CD-ROM for our prototype demonstration.

Limitations

The number of participants was limited for the quantitative data due to time and cost constraints in the research study, so it may make generalization difficult. Wikipedia (2008) mentioned that the convenience sampling “cannot scientifically make generalizations about the total population from this sample because it would not be representative enough”. However, our team has the difficulty to execute any probability samplings due to the huge numbers of primary students in Hong Kong. Furthermore, the study was conducted in an appropriate process as an essential academic scholar.

Besides, the bivariate analysis, e.g. age or gender towards attitudes in DLs, was not applied in the research analysis as the questionnaire sampling size was relatively small in relation to the whole primary school student population in Hong Kong.

Finally, our DL prototype was focused on the interface layouts and designs, and we ignored the database designs in relation to the DL functions.

Conclusions

From our findings, children hate reading items from ‘teacher-must-read-lists’ as it’s just like another piece of school assignment, which reduce reading interests. Although teachers recognized the problem, they have no choice to keep track on students’ reading process unless giving them some after-reading exercises, which further increase their workload in return. Accordingly, it is meaningless for schools to buy or subscribe new printed books which are unread by students.

DLs, which have already been popularly used at tertiary level, should also show its advantages at primary sector as one of our teacher interviewee mentioned:

> “Interactive and independent learning is the main trend….the printed textbooks being non-interactive and sometimes dull do not provide enough entertainment for the new generation. As a result the students lose interest in reading…… [and] DLs can provide an adequate and entertaining environment for the students to read.”

For children, they can login their subscribed accounts at home to search and retrieve for their preferred reading items, read it, rate it, comment on it, etc. For teachers, assuming there are a projection system and a computer per classroom, teachers can

browse the DL; search for a storybook and read the story aloud to students in story lessons. Every student could enjoy the same book and have fun together. Teachers can also keep on track of students' reading progress by reading students' comments and checking their frequency in visiting DL as recorded in the database. For schools, the storage cost of physical books will be saved.

Being witnessed the needs of digital libraries to cope up with children's reading trend from our findings; the use of DLs will soon be another upcoming e-learning tool to stimulate reading in primary education. With various suggestions made in our final prototype design to facilitate an interactive and independent platform children, DLs, have no doubt, combine the state of the art technology with various types of reading materials that could be beneficial in engaging young users by offering

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Appendix

Appendix 1: Two teacher face-to-face interviews

The five open-ended format questions in English are listed below:

1. What are you doing to encourage your students to read at present? (E.g. provide teacher-must-read –booklist)

   Have you introduced any electronic resources to your class? Please state.

2. What is the most beneficial activity to encourage your students to read?

3. Have you faced any difficulties in stimulating student reading?

4. Do you think digital libraries can encourage your students to read?

5. Do you think that digital libraries can simplify your work in encouraging reading?

Interviewee 1 – Dr. So from the Hong Kong Institute of Education's answers:

1. He requires the students to read English newspapers weekly, especially the local and international hot topics, and highlight the keywords and new vocabularies. He also chooses simple storybooks for the students. If the students are weak in English, he does not require them to read storybooks, but they have to find some new names or vocabularies, such as signage, in a weekly basis in their daily lives. However, he never introduced any e-resources to the students in his class.

2. Apart from asking the students to watch English TV programs and read English newspapers, he conducts interactive learning in class. He organizes some simple games in his class in order to compel the students to speak up. For instance, one student needs to give orders to tell another student to follow the instructions. He believes this game can encourage the students in practicing the English listening and oral. He also emphasizes that each game will play at least twice as the students' performance on the first occasion may not be that good, but the second time, it can be better.

3. He points out that the students take a long time to finish reading one storybook because they may not understand the book, especially if there are too many difficult vocabularies. He stated that when the students have to check dictionaries all the time, they will lose the interest in enjoying reading. However, he has no idea how to teach the students to check dictionaries ONLY for keywords.

4. He thinks the digital libraries are very convenient for the students to retrieve and read the books. He also believes that the digital libraries can definitely solve the storage problems, and they can provide the books to many students at the same

time. He mentioned if the e-books provide Chinese explanation in certain English keywords, it would help solve the problem he mentioned in Question 3.

5. It all depends on the equipments provided in schools. He told us that all the computing equipment is organized by the Education Bureau (EDB), and EDB usually offers the old equipment, which is not easy to maintain and does not provide a good electronic environment for the primary students. However, he said he will consider the digital libraries if they provide a comprehensive set of services. For example, they should provide after reading exercises so that the teachers can trace whether the students really read the storybooks or not. He also believes the exercises can also help improve the students' English writing skills.

Other opinions:

He mentioned that the digital libraries are just extra supplements or resources for the teachers to utilize in class. In order to encourage or compel teachers to use them frequently, the digital library developers should provide more outcome statistics to show that the digital libraries can effectively and efficiently improve English for the primary students.

Furthermore, he recommended that audio supports should be provided so that they can improve the students' English listening skills at the same time.

Interviewee 2: An English teacher's answers:

1. Mr. Kan always compels his students to read more English books. He requires his students to do lots of after-reading exercises as homework so that the students have to read the English books in order to complete their homework. However, he never introduced any electronic resources to his class.

2. Mr. Kan believes that a compulsory reading policy is the most beneficial way to make the students read more English books. He emphasizes that the children in Hong Kong have very weak reading habits, so he has to compel his students to read more by making reading as an integral part of homework
3. He recognizes that the printed textbooks being non-interactive and sometimes dull do not provide enough entertainment for the new generation. As a result the students lose interest in reading, this is especially so when the book is not in the mother tongue. He says that he tried, in the past, other methods to encourage his students to read the English books, such as offering merits based on reading certain numbers of books and reading with them during the lessons, but the

students were still not willing to read. He believes that it is because the print textbooks are totally not attractive to students. Therefore, he thinks the compulsory reading scheme is the best way to involve students in reading.

4. He points out that it depends on the numbers and quality of collections in the DLs. Nowadays, interactive and independent learning is the main trend. If the DLs can provide an adequate and entertaining environment for the students to read, it will be beneficial to them.

   However, he worries that if the DLs are uninteresting or provide insufficient supports for the students, he will not suggest and encourage the students to join them. He considers the possibility that combining the state of the art technology with teaching materials could be beneficial in engaging young students. Furthermore, the graphical animations and simulations in the DLs are more stimulating to the students. They undoubtedly prefer to read from something new such as the DLs rather than the old and traditional printed books.

5. He repeats that if the DLs can provide the interactive and independent platform for the students to read, the teachers can then simplify their work either by

preparing less paperwork or enabling students to read on their own through the interactive and independent platform.

He states that one great advantage of the digital format books in the DLs is that they can be retrieved and read by all students concurrently. It can save his time to prepare printed materials manually for whole class. Apart from that, more interactive teaching approaches may be found to build up reading habits among the DLs. As a result, the teachers can focus on other academic areas rather than consider how to encourage the students to read. Finally, he thinks that the DLs should have some attractiveness, which allows the students to learn by themselves; this may decrease the teachers' workloads.

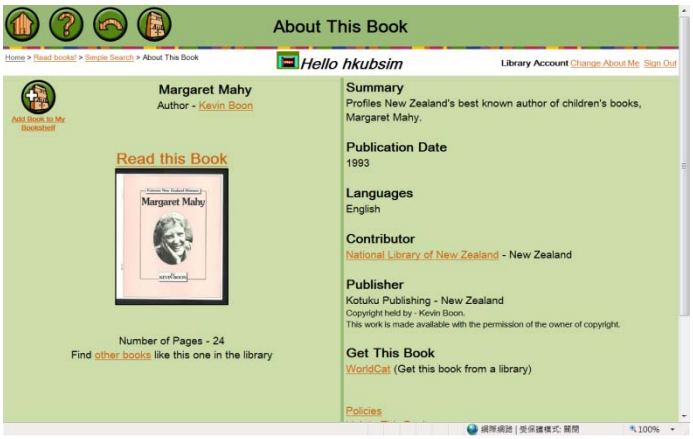
Appendix 2: Two Students' Task Observations

The observations are divided into 3 parts in English as below:

Part A: Follow the steps

1. Register and login the International children's Digital Library (www.childrenslibrary.org/)

2. Use the "Simple Search" to find an eleven years old, pink colour and short book called "Margaret Mahy", and read it.



3. Use the "Keyword Search" to look for the same book.
4. Bookmark the book and check the bookshelf.

Part B: Survey

1. The tasks can be performed in a straight-forward manner

Never				Always
1	2	3	4	5

2. The steps to complete a task follow in a logical sequence

Never				Always
1	2	3	4	5

3. Feedback on the completion of a sequence of steps

Unclear				Clear
1	2	3	4	5

4. The ease of the register and login process was …

Difficult				Easy
1	2	3	4	5

5. The ease of the Simple Search process was …

Difficult				Easy
1	2	3	4	5

6. The ease of the Keyword Search process was …

Difficult				Easy
1	2	3	4	5

7. The use of the bookshelf was …

Complex				Simple
1	2	3	4	5

Part C: Surfing

Instructions:

1. Visit the International children's Digital Library (www.childrenslibrary.org/)

2. Search for personal interests / needs and THINK ALOUD. (15 minutes)

Questions:

1. Are there any suggestions for improvement in terms of:
   - Use of color/ graphics/ pictures – Does the digital library make good use of color? Are the graphics used appropriately?
   - The navigation – Do you find the modules easy to navigate? Anywhere should it improve?

2. Do you see any other areas for improvement?

3. Problems – Did you encounter any other problems or difficulties that you didn't mention earlier?

Participant 1

Part A:

1. It's easy to find the link but I don't know how to register.

2. I cannot find the pink covers button.

3. I don't know how to spell the book title.

4. I am not used to use bookmark after reading a book.

Part B:

Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7
4	3	4	3	3	4	4

Part C:

1. In terms of the interface, I think there're too much wordings in the homepage. More beautiful

graphics should be added everywhere in the web pages.

2. More pictures should be added. And the background color should be made more attractive.

3. I cannot find the search buttons in the beginning. But I think I can find many interesting books from this digital library.

Participant 2

Part A:

1. The button for *Kids* is not colorful enough.

2. I cannot recognize the pink covers button is in the second page.

3. I cannot find the keyword search button.

4. I like using bookmark very much. I can add many books in it.

Part B:

Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7
4	3	2	4	3	4	4

Part C:

1. More colorful buttons should be added. I love using the bookmarks very much as it seems that I can add my favorite books in it. It seems that I am having my own library.

2. I love listening to stories and thus I suggest that the digital library should add some audio clips in the books. Also, I think the use of color for background is not attractive enough. And it should display more books per one search pages.

3. I think I can search many interesting books after I get used to the navigation module with the

help of you.

Appendix 3: Pilot Test for Task Observation

A 10 years old boy spent about 30 minutes to complete the whole Task Observation. After his comments and the result findings, our team amended the following parts in the Task Observation:

In Part A:

The tasks “Use the *Comic* book viewer.” and “Use the *Spiral* book viewer.” were deleted as we did not think these 2 tasks helped to figure out the respondent towards the interface design and preferred search options.

In Part B:

As the 2 tasks in Part A were deleted, the ratings for “The use of the *Comic* book viewer was …” and “The use of the *Spiral* book viewer was …” were also deleted.

In Part C:

- Use of color – Does the digital library make good use of color? Is there anyway it can improve?
- Use of graphics/ pictures – Are the graphics used appropriately? Are there any suggestions for improvement?

We combined the above 2 questions into one question as below because the participant gave

comments altogether.

- Use of color/ graphics/ pictures – Does the digital library make good use of color? Are the graphics used appropriately?

Appendix 4: Pre-survey Activity (Instructions)

THE UNIVERSITY OF HONG KONG
FACULTY OF EDUCATION
&
PEARSON EDUCATION ASIA LIMITED

Encourage the use of a digital library in stimulating primary students in English Reading

Pre-survey Instructions

1. Visit the International children's Digital Library (www.childrenslibrary.org/)
   Then, click the "MORE" button

2. Try the following search functions as you like:
   - ✧ Find Books
   - ✧ Keyword search
   - ✧ Advanced search
   - ✧ Recently Added Books
   - ✧ Award-Winning Books
   - ✧ Full Book List
   - ✧ Author and illustrator list
   - ✧ Feature Books
   - ✧ Collection

3. Search and select at least 1 of your favorite books and read it.

Appendix 5: Questionnaire Sample

THE UNIVERSITY OF HONG KONG
FACULTY OF EDUCATION
&
PEARSON EDUCATION ASIA LIMITED

Encourage the use of a digital library in stimulating primary students in English Reading

Objective:
This questionnaire is designed to study Primary 4 to Primary 6 students' preference in reading both printed and electronic materials. Data collected will be used to help design a commercial digital library interface prototype for encouraging children to read.

Instructions:
Take 15 minutes to complete the questionnaire. During the questionnaire, you are able to raise any questions if you do not understand. There are 12 questions in total. Please make good use of the time to complete all the questions stated below.

Note:
Your identity will be confidential. The collected data and results will be published anonymously.

Part 1 Reading Preference
第一部份　閱讀習慣

1. How often do you read? (Tick one box only)

你常常閱讀嗎？（只選一項）

Every day or almost every day 每天或差不多每天	☐	Once or twice a week 每星期１次至２次	☐
Once or twice a month 每月１次至２次	☐	Never or almost never 從不閱讀	☐

2. How many hours do you spend accessing to the internet every day? (Tick one box only)

你每天會花多少時間於網上瀏覽？（只選一項）

More than 4 hours 多於４小時	☐	2-4 hours ２至４小時	☐
Less than 2 hours 少於２小時	☐	Never or almost never 從不上網	☐

3. I get online for……(Tick more than one options)

我上網是為了…（可選多項）

Doing school assignments 做功課	☐	Playing games 玩網上遊戲	☐
Writing personal blogs 寫網誌	☐	Searching reference 搜尋資料	☐
Participating in Online Forums 參與網上論壇	☐	Checking emails 檢查電子郵件	☐
Chatting with friends 與朋友網上交談 (e.g. Facebook, MSN)	☐	Watching videos from YouTube 於 YouTube 觀看影片	☐

For others, please specify:

其他，請註明：_____

4. I prefer reading…… (Circle <u>one</u> option only in <u>each row</u>)

我較喜歡閱讀… （於<u>每列圈一</u>項）

(1)	Printed Books 印刷書籍	E-books/ Audio Books 電子書籍/發聲書籍
(2)	Supplementary Exercises 印刷補充練習	Online Exercises 網上練習
(3)	Dictionary 字典	Online Dictionary 網上字典
(4)	Magazines 雜誌	Online Magazines 網上雜誌
(5)	Newspapers 報紙	Online Newspapers 網上報紙
(6)	Comics 漫畫	Online Comics 網上漫畫

5. Do you read electronic materials more frequently than printed materials? (Circle one number only)

與印刷刊物比較，我較多閱讀電子刊物。（只選一個數字）

Read printed materials more 較多閱讀印刷刊物		**About the same** 差不多		**Read electronic materials more** 較多閱讀電子刊物
1	2	3	4	5

6. What do you think about electronic materials? (Tick one box only in each row)

你對電子資訊有何看法? (於每列選一項)

	Strongly Disagree 非常不同意	**Disagree** 不同意	**Neutral** 無意見	**Agree** 同意	**Strongly Agree** 非常同意
(1) I can search electronic document conveniently anytime & anywhere. 我於何時何地都能輕鬆存取電子文件。	☐	☐	☐	☐	☐
(2) I can get suitable electronic document easily. 我可輕易搜尋合適的電子文件。	☐	☐	☐	☐	☐
(3) I prefer to read computer screened document. 我喜愛於電腦屏幕上閱讀。	☐	☐	☐	☐	☐
(4) Reading electronic document is sharable, sociable and interactive. 電子文件較易與朋友分享。	☐	☐	☐	☐	☐

Part 2 Experience in using International Children's Digital Library (ICDL)
第二部份　ICDL 之使用體驗

7. The ICDL provides an easy and user friendly interface (Circle one number only)
ICDL 提供了簡單和容易掌握的操作介面。（只選一個數字）

Strongly Disagree		Neutral		Strongly Agree
非常不同意		無意見		非常同意
1	2	3	4	5

8. Which of the following features provided by ICDL have you used before? (Tick one box only in each row)
你曾經使用過哪項 ICDL 提供的功能？ (於每列選一項)

	YES 有	NO 沒有
Find Books	☐	☐
Keyword search	☐	☐
Advanced Search	☐	☐
Recently Added Books	☐	☐
Award-Winning Books	☐	☐
Full Book List	☐	☐
Author and illustrator list	☐	☐
Feature Books	☐	☐
Collection	☐	☐

9. I value the features of ICDL…….(Tick one box in each row only)
我給 ICDL 功能之評價是… (於每列選一項)

	No value 非常不喜歡		Neutral 一般		High value 非常喜歡	No idea 不知道
	1	**2**	**3**	**4**	**5**	
Find Books	☐	☐	☐	☐	☐	☐
Keyword search	☐	☐	☐	☐	☐	☐
Advanced Search	☐	☐	☐	☐	☐	☐
Recently Added Books	☐	☐	☐	☐	☐	☐
Award-Winning Books	☐	☐	☐	☐	☐	☐
Full Book List	☐	☐	☐	☐	☐	☐
Author and illustrator list	☐	☐	☐	☐	☐	☐
Feature Books	☐	☐	☐	☐	☐	☐
Collection	☐	☐	☐	☐	☐	☐

Part 3 Reading and Digital Library
第三部份　閱讀與電子圖書館

10. I would read more if a digital library consists of features, such as, (Tick more than one options)

如果電子圖書館有以下額外功能，我會多些閱讀和使用。（可選多項）

Sticky notes 電子黏貼 ☐	Highlighting pens 電子螢光筆 ☐	Audio clips 聲效按鈕 ☐
Online Games 網上遊戲 ☐	Shared notes 筆記分享 ☐	Animations 動畫 ☐
Rubber stamps 電子圖章 ☐	Ratings 評分 ☐	Chatroom 網上聊天室 ☐
Electronic dictionary 電子字典 ☐	Online bulletin boards 電子公佈板 ☐	Electronic bookmarks 電子書簽 ☐

For others, please specify:

其他，請註明： _____

11. I would read more if there's a digital library at school. (Circle one number only)

如果學校有電子圖書館的話，我便會多些閱讀。（只選一個數字）

Strongly Disagree		**Neutral**		**Strongly Agree**
非常不同意		無意見		非常同意
1	2	3	4	5

12. I suggest…

我建議…

_____

_____

_____

Part 4 Personal Information
第四部份　個人資料

School name:

學校名稱： _____

Class and Class no: **Age:**

班別及班號： _____ **年齡：** _____

Appendix 6: Questionnaire Data

The questionnaire data is showed below:

Question	Total respondents: 82 (100%)
Q.1	
Every day or almost every day	39 (47.56%)
Once or twice a week	24 (29.27%)
Once or twice a month	10 (12.20%)
Never or almost never	9 (10.98%)
Q.2	
More than 4 hours	12 (14.63%)
2-4 hours	20 (24.39%)
Less than 2 hours	48 (58.54%)
Never or almost never	2 (2.44%)
Q.3	
Doing school assignments	50 (60.98%)
Playing games	56 (68.29%)
Writing personal blogs	13 (15.85%)
Searching reference	37 (45.12%)
Participating in Online Forums	20 (24.39%)
Checking emails	28 (34.15%)
Chatting with friends	37 (45.12%)
Watching videos from YouTube	37 (45.12%)
Others	0 (0%)
Q.4	
Printed Books	50 (62.5%)
E-books/ Audio Books	30 (37.5%)
Supplementary Exercises	28 (35%)
Online Exercises	52 (65%)
Dictionary	29 (37.18%)
Online Dictionary	49 (62.28%)
Magazines	55 (68.75%)
Online Magazines	25 (31.25%)
Newspapers	56 (70.89%)
Online Newspapers	23 (29.11%)
Comics	53 (66.25%)

Online Comics	27 (33.75%)
Q. 5	
1 2 3 4 5	13 (16.46%) 6 (7.59%) 41 (51.90%) 9 (11.39%) 10 (12.66%)
Q.6	
Q.6.1: 1 2 3 4 5	7 (8.86%) 5 (6.33%) 27 (34.18%) 25 (31.65%) 15 (18.99%)
Q6.2: 1 2 3 4 5	9 (11.39%) 9 (11.39%) 17 (21.52%) 30 (37.97%) 14 (17.72%)
Q6.3: 1 2 3 4 5	11 (13.92%) 15 (18.99%) 21 (26.58%) 14 (17.72%) 18 (22.78%)
Q6.4: 1 2 3 4 5	11 (13.92%) 5 (6.33%) 21 (26.58%) 25 (31.65%) 17 (21.52%)
Q.7	
1 2 3 4 5	6 (22.50%) 5 (6.25%) 39 (48.75%) 18 (22.50%) 12 (15.00%)
Q.8	
Find Books	YES 63 (77.78%) NO 18 (22.22%)
Keyword search	YES 45 (55.56%) NO 36 (44.44%)
Advanced Search	YES 39 (48.15%) NO 42 (51.85%)
Recently Added Books	YES 38 (46.91%) NO 43 (53.09%)
Award-Winning Books	YES 34 (41.98%) NO 47 (58.02%)
Full Book List	YES 42 (51.85%) NO 39 (48.15%)
Author and illustrator list	YES 31 (38.27%) NO 50 (61.73%)
Feature Books	YES 46 (56.79%) NO 35 (43.21%)
Collection	YES 32 (39.51%) NO 49 (60.49%)
Q.9	
Find Books 1 2 3 4 5 No idea	1 (1.23%) 5 (6.17%) 28 (34.57%) 12 (14.81%) 21 (25.93%) 14 (17.28%)
Keyword search 1 2 3 4 5 No idea	1 (1.23%) 5 (6.17%) 26 (32.10%) 10 (12.35%) 14 (17.28%) 25 (30.86%)
Advanced Search 1 2 3 4 5 No idea	1 (1.23%) 5 (6.17%) 28 (34.57%) 8 (9.88%) 9 (11.11%) 30 (37.04%)
Recently Added Books 1 2 3 4 5 No idea	0 (0.00%) 3 (3.70%) 24 (29.63%) 12 (14.81%) 8 (9.88%) 34 (41.98%)

Award-Winning Books 1 2 3 4 5 No idea	 2 (2.47%) 3 (3.70%) 26 (32.10%) 6 (7.41%) 10 (12.35%) 34 (41.98%)
Full Book List 1 2 3 4 5 No idea	 1 (1.25%) 4 (5.00%) 25 (31.25%) 6 (7.50%) 14 (17.50%) 30 (37.50%)
Author and illustrator list 1 2 3 4 5 No idea	 3 (3.70%) 5 (6.17%) 24 (29.63%) 9 (11.11%) 7 (8.64%) 33 (40.74%)
Feature Books 1 2 3 4 5 No idea	 1 (1.23%) 8 (9.88%) 24 (29.63%) 10 (12.35%) 13 (16.05%) 25 (30.86%)
Collection 1 2 3 4 5 No idea	 4 (4.94%) 3 (3.70%) 24 (29.63%) 3 (3.70%) 13 (16.05%) 34 (41.98%)
Q.10	
Sticky notes	27 (32.93%)
Highlight pens	39 (47.56%)
Audio clips	35 (42.68%)
Online games	56 (68.29%)
Share notes	19 (23.17%)
Animations	38 (46.34%)
Rubber stamps	26 (31.71%)
Ratings	16 (19.51%)
Chatroom	35 (42.68%)
Electronic dictionary	42 (51.22%)
Online bulletin boards	19 (23.17%)
Electronic bookmarks	28 (34.15%)
Others	0 (0.00%)
Q.11	
1 2 3 4 5	4 (5.06%) 6 (7.59%) 41 (51.90%) 13 (16.46%) 15 (18.99%)
Q.12	
	• 8 respondents want to have Chinese books. • 6 respondents want to have games. • 4 respondents want to have more books provided. • 3 respondents want to have Chinese translation. • 2 respondents want to have more different languages. • 2 respondents want to have comics.

	● 1 respondent want to have stick notes. ● 1 respondent want to have UFO related books. ● 1 respondent want to have novels. ● 1 respondent want to have picture books more. ● 1 respondent want to have audio provided books.

Appendix 7: Pilot test for the Questionnaire

A 10 years old boy and a 9 years old girl spent 15 minutes respectively to answer the questionnaire, after completing the questionnaires; they were required to give us some comments about the questionnaire. During the pilot test, our team tried to assistant them to complete every question.

Comments:

- Chinese version was added as they did not understand some questions.
- In Question 4, they got confused how to choose the answers, so instruction needed to be emphasized. Therefore, we amended the question from

  "I prefer reading…… (Circle one option only in each row)" to

  "I prefer reading…… (Circle <u>one</u> option only in <u>each row</u>)".
- In Question 8, if they did not try the features in ICDL, then they might not be able to rate the features in Question 9. Therefore, "No idea" column was added after the pilot studies.
- In Question 10, they did not know what "it" is referred to. Therefore, we amended the question from

  "I would read more if it consists of features, such as" to

  "I would read more if a digital library consists of features, such as".