

Usability Analysis of Children's iPad Electronic Picture books

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Abstract—The main purpose of the research is to understand the current situation of design and development of iPad electronic picture books and analyze the usability. The researcher used the ranking lists search and browsing in the Apple Store for browsing various electronic picture books in great number. In the final stage, we screened out six different models to be used in iPad electronic picture books and conducted the analyses of usability. We selected by purposive sampling 15 adults (including eight teachers and seven mothers) and six six-year-old children (3 boys and 3 girls) who had experiences of using iPad. The subjects at first browsed six electronic picture books. Then 15 adults filled out the questionnaires, six children were interviewed and their operations were observed to understand their preferences and the uses of the products. The research found that the commonalities of the design of iPad electronic picture books a) dominated by page style; b) focused on linear development; c) most of interactive designs of story contents are clicking the objects on the screen; d) provided different languages and audio versions; e) most of them adopted the design of limited animation in which they used zoom-in and zoom-out and diversion techniques to show animations. The recommendations for future publishers and designers were: a) increase the interactions of story content; b) increase traditional Chinese subtitles and voice; c) integrate picture book platforms.

Keywords- Usability; e-Picture Book; iPad Picture book

I. INTRODUCTION

The 3C products such as tablet PC, iPad, smart phone and e-book reader are unknowing invade our daily life. For the new-generation of children, the time and opportunities for reading paper books hence become less and less while the time spending on 3C products are more and more. Therefore, the contents provided by those tools become a focus point of concern. The new reading equipments not necessarily enable the children to love learning and reading, but undeniably, equipped by e-book reader and combined with multimedia elements, the reading contents have provided a different reading experience. When the iPad launched in May 2010, it was reported to be one of the most popular electronic devices [1][2]. iPad, combined a touch screen and multimedia, provides an experience of more intuitive operation than web pages and CD versions. The main purpose of the research is to understand the current

situation of design and development of iPad electronic picture books and analyze their usability.

II. LITERATURE REVIEW

A. Electronic Book

The Chinese term “electronic book” is directly translated from English. In literature, Van Dam mentioned electronic books for the first time. In a broad sense, it means the media that stores and transmits the characters and pictures information through electronic channel [3]. Barker [4] argued that the electronic book was used to describe new type of books that was different from traditional paper books. But like paper books, they were composed of pages. The difference was that each page of an electronic book was designed and dynamic electronic information. Electronic book could be considered an aggregation of multi-pages, responsive and lively multi-media (includes information of characters, picture or voice). A picture book is an art form that combines visual and verbal narratives in a book format. A true picture book tells the story both with words and pictures. Electronic picture book (or e-Picture book, EPB) is to present picture books in the electronic form including CD-ROM, WWW. The applied multi-media elements include characters, pictures, animations, voice, sound effects and music. It mainly operates through mouse and keyboard in user control (interactive operation pattern). The manipulation of mouse includes drag and click whereas the manipulation of the keyboard I include character enter and key enter. The source of story materials includes adaptation and creation. The E-book in the research means iPad e-Picture books.

B. Usability

Schneiderman [5] emphasizes consistency and predictability in interface design that provides for a high level of user control. Usability means that the people who use the product can do so quickly and easily to accomplish their own tasks. This definition rests on four points: (1) Usability means focusing on users; (2) people use products to be productive; (3) are busy people trying to accomplish tasks; and (4) users decide when a product is easy to use [6]. Lazar [7] highlights ease-of-use as an equally important usability consideration he also advocates for a balanced

approach to Web design that allows for the appropriate use of media elements such as graphics, plug-ins, and animation.

Usability is the quality of attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process. Usability is defined by five quality components: (1) Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design? (2) Efficiency: Once users have learned the design, how quickly can they perform tasks? (3) Memorability: When the users return to the design after a period of not using it, how easily can they reestablish proficiency? (4) Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors? (5) Satisfaction: How pleasant is it to use the design? [8]

In conclusion, usability includes considerations such as: (1) Who are the users, what do they know, and what can they learn? (2) What do users want or need to do? (3) What is the general background of the users? (4) What is the context in which the user is working? (5) What has to be left on the machine? Usability is the ease of use and learnability of a human-made object.

III. METHODOLOGY

A. Procedure

1. In January 1 to January 31, 2011, the researchers searched for electronic picture books in the Books category of Apple App Store, and found 65 production companies publishing electronic picture books for iPad in total. According to the overall design, 6 more distinctive electronic picture books were chosen by the researchers for further questionnaire, interviews and observation.
2. The iPad 2 (Wi-Fi only) with 64GB memory and iOS 4.3 was selected for the study.
3. A questionnaire survey of five-point Likert items (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, 5: strongly agree) and interviews were performed to adult users. The content of the questionnaire mainly included overall design, easy operation, story animation design, text design, and voice design. The interviews mainly involved questions about the operations of electronic picture books from different websites, and finding out the reasons of users' satisfaction or dissatisfaction.
4. Observations of child users' operations and interviews with those users were made. The researchers observed child users' behaviors in the operation process, and interviewed them about the issues they had encountered in their operations.

B. Study Subjects

1. 15 adults who had not used the iPad before (4 elementary school teachers, 4 kindergarten teachers and 7 mothers who had at least one child) randomly browsed the 6 electronic picture books, then filled out the questionnaire. 8 of the adults had master's degrees, and 7 had bachelor's degrees. Every subject took about 1 hour to finish the

process.

2. 6 children who had not used the iPad before (six 6-year-old, half were boys and half were girls) randomly browsed the 6 electronic picture books, and were observed and interviewed by the researchers. Every time after finishing one electronic picture book, each child was asked if the rest was needed, and took rests when necessary. Every subject took about 1-1.5 hours to finish the process.

IV. RESULTS AND CONCLUSIONS

The results of the questionnaire and interviews are summed up as follows:

A. Overall Design

Although the styles of the six electronic picture books were different, users all had pretty good satisfaction to them. The scores the picture books got on the questionnaires filled by the adults were all 4.1 and above. The children liked the picture books as well. For example, C3 said "I hope Father and Mother will buy them for me, I like every one of them.", C5 said "It would be great if our textbooks were this interesting."

B. Operation Design

The user can operate the flip function of electronic picture books. The picture books that had left and right arrow marks on the screen were instantly understood by users. Children needed the researchers' reminding to roll over pages, but had no difficulties on operation either. Also, they became more skilled in operating auto and manual play, and text / voice switch, after they encountered them twice. Child users said that it was really convenient to click with fingers. "Snow White - 3D Pop-up Book" had the most different design among the six electronic picture books, but could as well be smoothly operated with hints given. The recording function provided by some of the picture books was very fresh to the subjects. For example, the child C2 said "It is fun that you can record the story you read."

C. Text Design

For the children in Taiwan, Chinese is their native language. Electronic picture books that were presented only in English were still difficult for the subjects. Adult subjects applauded that electronic picture books provided versions of multiple languages for operators. For example, the teacher T4 said "Take Little Snail as an example. It provides many different text languages so that more people in the world can browse it. That is what present multimedia design can do." Only most adult subjects thought that the traditional Chinese version should be modified for Taiwan's readers.

D. Illustration Design

The six electronic picture books have different styles and each subject has his own preference. As a whole, the average scores of adult questionnaires were over 3.9. "I love all of them, but 'The Three Little Pigs' is the one I love most

because the pig in the book can move; ‘Snow White’ is also very special and I have never seen such book.”

E. Voice Design

Text and voice is mutually collocated that most of the adult subjects for the part of the Chinese voice proposed that it be appropriate to find native Taiwanese for dubbing to avoid the interference from an accent in listening. The adult subjects affirmed that the English text was helpful to the non-English speaking readers for the enhancement in learning English, but proposed to add the Chinese that more Taiwanese audience could participate in.

F. Animation Design

Most of the electronic picture books on the current iPad are presented without or with limited animation. The limited animation is dominated with the movement of leading characters or part of objects, or zoom-in and out and movement of camera shots. The child subjects showed high interest in the dynamic performance. When the researcher hinted that some figures or objects in the frame can be clicked with fingers. For children, it is a very new try and they will try to click to see if there is any reaction.

As a whole, there are two primary common points in the six electronic picture books: 1) single-line development of the story; 2) the contents of the story lacks of interactions that both adult and child users indicated that they wish to read more electronic picture books if they have a chance because there are many differences comparing to reading physical books.

V. SUGGESTIONS

This research evaluated the operation and uses of six selected electronic picture books and gave following suggestions for the reactions from the subjects. It is hoped that in future, more selected picture books and subjects could be used for the usability evaluation that will prompt more concrete contributions to the designs of electronic picture books.

A. Enhance the interaction of the story

Given the fact that many picture books were adapted from printing picture books in which the story is developed in single-line, the interaction of story contents is limited. The advantages of multi-media are that it could facilitate the increase of interaction. In the future, we could bring the characteristics into full play by increasing double-line or even multi-line developments of the story and the design of interaction with the contents of the story to enhance the interaction between readers and story contents.

B. Increase Traditional Chinese Subtitles and Voice

At the present time, only a few developers provide traditional subtitles and voice in their electronic picture books including Rye Studio、Apple Style、RYBooks Studio. Many other excellent electronic picture books choose English as their only or primary language. But they can just add traditional Chinese subtitles and voice to meet the requirement from readers in Taiwan. So we suggest that the developers cooperate with foreign developers in adding traditional Chinese subtitles and voice for the readers in Taiwan that more children have a chance to read the rich contents of electronic picture books.

C. Integrate Picture book Platforms

Although there is classification of books in Apple App Store, searching for specific electronic picture books is a time-consuming job. Therefore, we suggest that create a classification for the electronic picture books or design a browser search interface exclusively for the children.

In summary, from the angle of emotional interaction, operation interaction, cognition interaction and community interaction, the design of existing electronic picture books could strengthen the cognition interaction and community interaction that the visitors could interact with the contents of electronic picture books through the characteristics of multi-media factors that are different from the printing books. Also, it could have meaningful community interactions with other readers through the linking of Internet. With the creativity and innovation of interactive technology, more and more excellent iPad picture book worthy of researchers continue to invest in research.

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TABLE I. THE BASIC INFORMATION OF THE SIX ELECTRONIC PICTUREBOOKS

Story Name	The Little Snail	One Pizza, One Penny	Just Grandma and Me	Bedtime Monster	The Three Little Pigs	Snow White - 3D Pop-up Book
Publisher	Rye Studio	Apple Tree & Guru Bear	Oceanhouse Media	Siena Entertainment, LLC	Nosy Crow	lee hee suck
Illustration Design	2D	2D	2D	2D	3D	3D
Language (Text)	English, Traditional Chinese, Simplified Chinese, Japanese, French, German, Spanish	English, Traditional Chinese, Simplified Chinese	English	English Spanish	English	English
Language (Voice)	English, Chinese, Japanese, French, German, Spanish	English, Chinese	English	English Spanish	English	English
Sleeping Mode (voice only)	✓	✓	✗	✗	✗	✗
Record	✓	✓	✗	✗	✗	✗
Flip Mode	1.Auto 2.Manual (click on last/next page button to turn)	1. Auto 2.Manual (click on bottom left/right corner to turn)	1. Auto 2. Manual (roll over the page to turn)	1. Auto 2.Manual (click on last/next page button to turn)	1. Auto 2.Manual (click on last/next page button to turn)	1. Auto 2.Manual (click on last/next page button to turn)
Page Index	✗	✗	✗	✓	✗	✗
Bookmark	✗	✓	✓	✓	✗	✗
Operating Instructions	✓	✗	✗	✓	✓	✗
Story Scenes Content Clicking	✗	✗	✓	✗	✓	✓
Simple Animation	✗	✗	✓	✗	✓	✗
Extended Activities	✗	✓	✗	✗	✗	✓



Figure 1. The Little Snail



Figure 2. One Pizza, One Penny

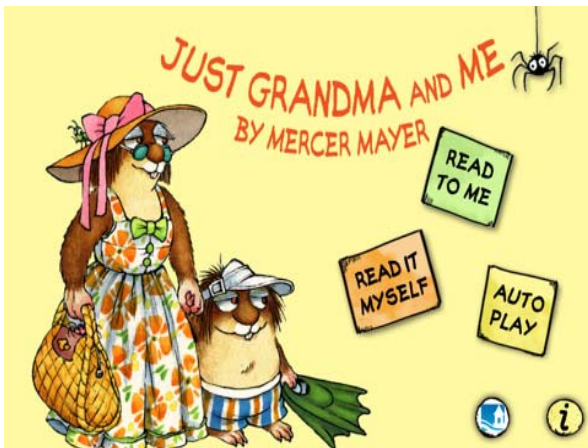


Figure 3. Just Grandma and Me

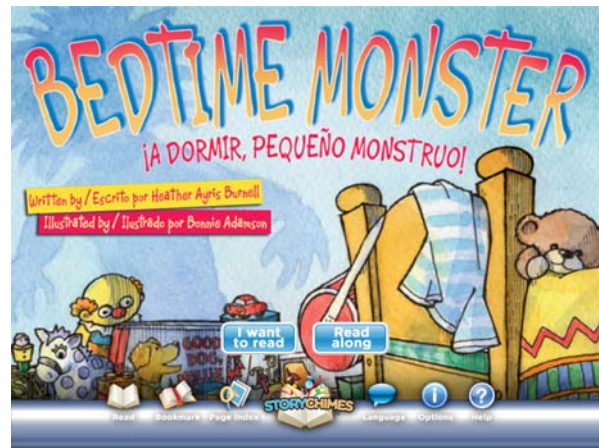


Figure 4. Bedtime Monster



Figure 5. The Little Snail



Figure 6. Snow White - 3D Pop-up Book