

A Study on User Experience Design in U. environment for Children

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Abstract: Since digital media showed up, content market in network service such as wireless internet and mobile service has been rapidly grown up. Moreover, convergence of product and content in ubiquitous environment is one of the phenomenons nowadays. Because of this reason, studying on new media and service for ubiquitous environment is very necessary and is being lively proceeded. While this study is more welcome by business or office-environmental market, digital media is not considered an appropriate material for children's education by parents. However, if some problems that concern parents are solved for children's education market, it will exceed the effect of edutainment.

This study aims to define user's needs in future ubiquitous network environment by in-depth observing and analyzing children's behaviors and their environment and everyday lives to get insights, and to come up with new ideas for the edutainment service for children in ubiquitous network. By observing the day of children – reading books, listening to music, and playing with toys- insights from research allow to redefine unwelcome digital media by parents as a reliable educational material. Also, studying children development psychology helps understand children by their ages and development stages.

In this study, I limited the range of users' age as between 3-6 year old groups; 3-4 year old toddler group and 5-6 year old preschooler group. The reason why I choose these groups is this is the most important time of children's physical and intellectual development. Most important method for the study is in-depth observation of these groups' behaviors with media, parents, peer groups, and the environment to analyze their behavior model for getting insights that will be applied to the important design elements of experience design.

By the synthesis of this study, the result will be user scenarios of user experience model in ubiquitous network environment to help understand the idea of how children, users, can use interactive media as an edutainment tool in U-environment.

Key words: *user experience, service design, children, edutainment, U. environment, context.*

1. Introduction

Since digital media showed up, digital content market has grown up rapidly. Based on this, more people want new and various contents in U environment. To meet these needs, the convergence of product and service is necessary. However, without understanding users, this cannot meet users' needs. To design new idea of the service, defining the service and understanding users and context is the first step to work on the project. "Designing Experience" means suggesting necessary service by understanding user behaviors, context and its environment. Especially for children, user groups who should be specially treated, study should be focused on understanding the characteristics of children. The aim of this study is to propose a user experience design for children in U environment to reduce waste of materials and exceed the edutainment effect by the content service that parents can rely on. In this study, I limited the range of users, 3-4 and 5-6 year old children groups, doing in-depth observation and in-depth interview of 62 children and their parents.

2. Media, content and interaction in U environment

2.1 The change of the way to consume media content: media ecosystem

Since the Internet became one of the media, the way of consuming content has been changed. In this circumstance, the technologies focus on allowing people to be free to use the service wherever they go by converging the product and the service. The service has become more personal to suit each user's needs such as mobile phone or PMP. While products were stand alone by themselves before, now more products are with networked service such as Amazon Kindle and Apple App.store.

One of the characteristics of this new media has the function of social networking. Not only do people want to be connected to the service but also to the other people like blog and internet community. This makes the media new and different from before. Another reason of this change is introducing 3G network which is already fully grown market for voice and video phone. This needs new business model because the network service for mobile phone market is saturated. For example, Amazon Kindle is the one of these cases. Amazon Kindle provides the product with 3G service that allows users to buy e-book wherever and subscribe newspapers delivering directly to their Kindle before the morning coffee like a real newspaper. With 3G network and huge content of on-line book store, Amazon, Kindle can offer easy way to shop and to read books by new experience using Kindle. Apple i-phone also offers 3G network and App.store service to allow users to broaden their experience with mobile phone. The App.store provides thousands of various applications that can exceed the function of i-phone and i-pod , and users can download useful and fun applications from App.store.



Figure.1 U map



Figure.2 Amazon Kindle



Figure.3 Apple. i-pod

2.2 The characteristics of content for children

There are a lot of contents for children in the market. From analog media to digital media, too many new contents are releasing every day. However, these won't last for holding children's interest because children tend to get bored easily and move on for new things. Especially analog media take more space and money to hold it unlike digital media. Although digital media are convenient to use and save, parents are not comfortable with this for their children because they don't think those are good for their kids. While analog media are visible, intuitive and tangible but limited, digital media are invisible, unlimited and intangible. Both have good sides, but many parents pick up more negative things from digital media.



Figure.4 Analog vs. Digital

3. Understanding Children by Children Development Psychology

3.1 Development of Language and Play

When children become age of 2 or 3, they acquire an ability of language and start controlling their thoughts and behaviors. While children are playing, they are learning also. In this age, the time of children's concentration is very short, but they can learn simple action by repeating the same action. N. Chomsky believed that people are born with L.A.D-Language Acquisition Device- which allows children to learn language getting, understanding and reproducing language. One of the characteristics of children's language is telegraphic speech which means children use the minimum words that deliver the meaning. Therefore, they use important words that deliver meaning such as nouns and verbs. They learn meaning of words first and then saying the words, so children can communicate with their parents even before starting speaking. After 1 year old, children start to draw, and 2-3 year old, children draw meaningless lines. While they draw the lines they exercise their muscle of hands with eyes together. When the age of 4-5, children can draw some designs such as people, houses, animals and trees. The drawing allows children to express their thoughts before they start speaking. After 3, questioning age starts, so they have a lot of curiosity. It is important to let children ask as many questions as they have. Another thing is animism which means children cannot distinguish between living things and not, so they tend to consider most things are living things that they can talk to.

3.2 In-depth interview

I interviewed 62 parents; 22 of 3-4 year old children's mothers and 40 of 5-6 year old children's mothers. More than 50% of interviewees answered they spend most of time with children, but they spend only a couple hours to play with them, and 3-4 year old group spend more time with parents actually playing together. 3-4 year old

group need more help from their parents when they consume the content; reading books, listening to music or watching web content.

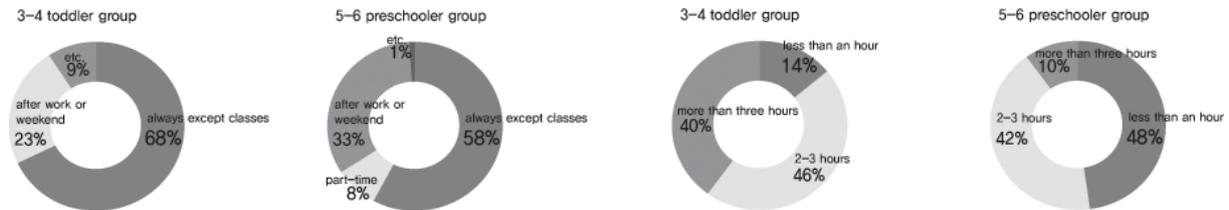


Figure.5 the time of being together with children-parents in each group

Many of mothers, more than 70%, get information regarding children’s education from people they know and the Internet. Especially, when they need to purchase something, they want to make sure it by other people’s opinion, which they trust. Word of Mouth affects decision making for choosing children’s contents.

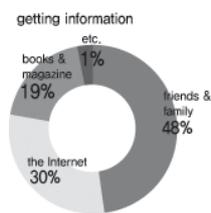


Figure.6 way to get information regarding children’s education

The most popular content is reading books among children. While 59% of 3-4 year old group read books at least 1-2 hours, 55% of 5-6 year old group read books less than 30 minutes. The reason why 5-6 year old children read fewer books is this group has more activities out of the home, going to preschool or taking other classes, because most of children read books at home. More than 60% of children read books before sleeping and more than 50% of children read more than 3-4 books a day. 61% of parents spend about \$50 a month for purchasing children’s contents such as books, CDs, or DVDs, 31% of parents spend about \$100 and 5% of parents spend about \$200. These content which parents bought only last 2-3 months to hold children’s interest. More than 70% of children lose their interest in new contents within 3 months, so parents need to buy new one.

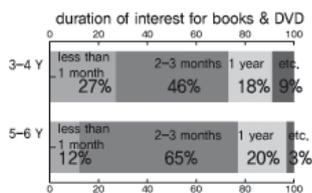


Figure.7 the period of life of new contents by children’s interest

Besides reading books, children play with mobile phones and TV. Especially 5-6 year old children watch more TV and using the computer for games and the Internet. Time of watching TV is about an hour by 47% of children and less than 30 minutes by 27% of children. Regarding using computer and the Internet, in 3-4 year old group, 59% of parents don’t allow the Internet, but 65% of 5-6 year old group parents say yes for using the Internet. When children go out with their parents, in 3-4 year old group they bring out toys and books, and in 5-6 year old group they take books, toys and portable game devices. Sometimes they have nothing to play, so they play with parents’ mobile phone. However, most of them only use free content.

Children need some help from their parents to listen to music or read books, but parents are mostly busy. It is hard for parents to have actual time to sit down with their children and play together. For that reason, new service would help parents have reliable content service and information in terms of children education.

3.3 In-depth Observation

Reading books: 3-4 year old children concentrate on one page or one character more than the story when they read books. They care the name, shape, or color of things more. They add a personal story on the object and repeat to say it or share with others. Children communicate with the illustration in their imagination. Not only are they interested in browsing books, but also they like to flip the pages of books. They have favorite pages from books, so they flip through books from the top to the end and stop their favorite pages to share with their parents. It is also a fun play for them.



Figure.8 reading, sharing and flipping books

Drawing: Drawing is the most popular play to cultivate their creativeness and emotion. For children, drawing is not only for describing things but also for expressing their thoughts and imaginations. Children like to copy from the illustration from books and ask the adults to draw something for them because they cannot draw exact object that they want to draw, so they like to draw with their parents.



Figure.9 drawing cat

Playing toys: Children play with various toys which are for fun or education. They tend to pay attention for everyday things besides toys. There are many toys which copy from real things such as toy mobile phone, toy laptop computer or kitchen toys. They play with every tings surround them like a piano, a computer and so on. They like to copycat adults do with real tings. If a toy that is too simple compare to real thing, children get board very easily, so they don't play with it much.



Figure.10 playing with toys and everyday things

Children don't play with just one toy because they can easily get bored by it, so they keep changing toys playing
Social activities: Children learn from peers very easily, so I could see the difference between children who start a class earlier and later. They learn each other and copycat each other. For this reason, there are many books using another kid or character to show what they should do or not to teach children. Even parents refer to books when they teach their kids because it is easier way for children to understand the circumstance. When parents travel with children, they need something to entertain kids while they are waiting. At the airport or at the department store or driving, kids need to wait until parents are available to play with them, so they play with PMP or game device or listening to music or constantly talking to mothers.



Figure.11 traveling kids

Digital media: children can learn fast to use digital media although they need some help from their parents. Using computer has more problems than using portable device such as mobile phone, Digital camera, or PMP. When they use a computer, it is hard to turn on or use it compare to portable device because it has more functions, so they need help from their parents. However, in 5-6 year old group, once they start using web site or some application, they can control pretty much by themselves. Although they can use it by themselves, parents need to supervise them in order not to be exposed to inappropriate contents for children.



Figure.12 using a computer

With simple button or touch screen, children can use portable device, mobile phone or digital camera pretty well. They can look through contents and play with it.



Figure.13 using i-phone, digital camera and remote-control.

Children tend to touch keypad, keyboard or screen first to interact with media. For this reason, portable media, which offer physical button or touch screen, is easier for kids to use. Listening to music, watching animation or movie clips or photos, taking photos and so on are the activities that kids do with portable devices. While children have more interactions with portable device, they don't have much interactions watching TV or DVD. Most of interactions with TV are turning on or turning off, so parents don't prefer for children to watch it more than an hour. With younger children, some parents hide TV or even remove TV at all.

3.4 Interaction between children and media

There are a lot of media to interact with children: books, toys, audio CD, DVD, computer and so forth. Most of media, children are exposed to, are chosen by their parents. There are a lot of contents for children, so it is important not only having various experiences but also choosing right and useful contents for children.

Reading & understanding: when kids read books, they see objects, characters, name of them, or color as well. It is also repeating playing process to learn new things. Since they cannot concentrate on one thing very long time, they travel one book to another book on and on. For young kids, they read illustrations than text. When children find a fascinating page of the book, they stop the page and show it to others playing with the book. They know in which book the lion is and in which book the cat is. They focus on the object of the page, and say it or point it learning new things.

Listening & copycatting: the most frequent listening activity is listening to music, but parents read or sing to them also often. When parents read or sing to children, they add their own experiences or memory to the story or song. This could make the story or song more interesting. While kids are playing, they are listening to music at the same time, and they mimic the song and react to the lyric

Flipping & operating: For kids, turning pages of the book is also a play. Sometimes they turn pages fast or slow or stop a page to look, or flipping forward or backward. These ways are the way to operate books. Not only

books, but children like to operate things by themselves, so they try to touch or push the button, keyboard or screen when parents operate things for them.

Children, between age of 3 and 6, are surrounded by good analog toys and books for their development.

However, those take more money, more materials, more space and even more effort from parents to provide seamless educational environment to travel content from one another.

4. Service design

4.1 User experience model

It is very important for users to use the new service effectively and creatively. In U environment, users should use the service easily wherever they go. Service model is based on Media-ecosystem, which is consisted of content provider, network service provider and product manufacturer. The actual service is e.tree, which is filtered good content pool, and this offer downloading service to extend the function of the device.

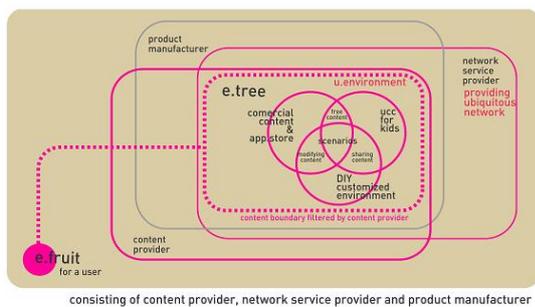


Figure.14 media-ecosystem & service experience model

Users can use the content pool, e.tree, by personal portable device, e.fruit, and they can choose either active-mode or inactive-mode to use the content. The content structure has CC, UCC and DIY, and user can use CC or UCC in both active-mode and inactive-mode, and use DIY in active-mode only. It allows user to upgrade by children's age, because it can be upgraded for different age stage as children grow old.

Content boundary	Type of content	Active	Inactive	Interaction Solution				Experience Structure
				Input-Play	Variables	E-dish	Product Feature	
CC & UCC	Names & Images	o	o	o	o	o	Touch screen / Wireless data access / Speaker	enrichment theory copycat night-night reading
	Short story	o	o	o	o	o	Touch screen / Wireless data access / Speaker	
	Reading story	o	o	o	o	o	Touch screen / Wireless data access / Speaker	
	Music & Songs	o	o	o	o	o	Touch screen / Wireless data access / Speaker	
DIY & sharing	Viewing Photos & Movies	o	o	o	o	o	Touch Tablet screen / Wireless data access / Speaker	mini-me illustration journals
	Playing Music	o	X	o	o	X	Touch screen / Wireless data access / Speaker	
	Drawing	o	X	o	o	X	Touch screen / Wireless data access / Speaker / Pen tool	
	Taking Photos & Movies	o	X	o	X	X	Touch screen / Wireless data access / Speaker / Camera	
	Recording	o	X	o	X	X	Touch screen / Wireless data access / Speaker / Recorder microphone	
	Playing with story	o	X	o	o	X	Touch screen / Wireless data access / Speaker / Camera / Recorder microphone	

table for content type & interaction solution Figure.15 content type by mode

Depends on content type, there are content provided by content-provider, and others are created by users. In active-mode, mainly users create and modify content for themselves or share while in inactive-mode it can be played by time-order or random for user's choice.

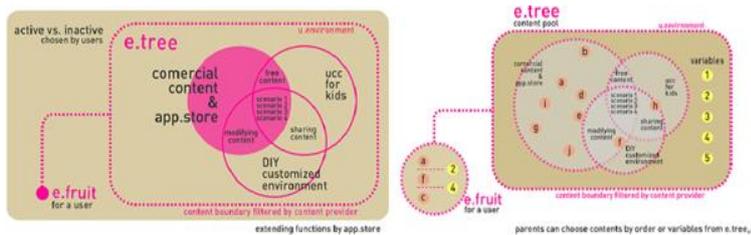


Figure.16 e.tree & e.fruit

There are three types of the content in e.tree; story content, information content, idea content, and these types of content can be mixed for one content. When the content is used, users can choose variables for using content more unexpectedly. It can be different every single time to make new experience. Also, users can create their own content or modified content, and it can be shared with other children. Also user can hyperlink their personal memory like photos, movie-clips, images or sounds to the content.

4.2 UX interaction

Play, input & stop: the e.fruit has to be networked to get full service. Main interaction is touch, tapping, flicking, drag, draw and gesture. Input interaction is touch, microphone and camera.

Active vs. Inactive: this service offer both active like books and inactive like TV. The reason why this service offers both modes is users need to choose either depending on use-circumstance. Using both modes has synergy effect for children's edutainment.

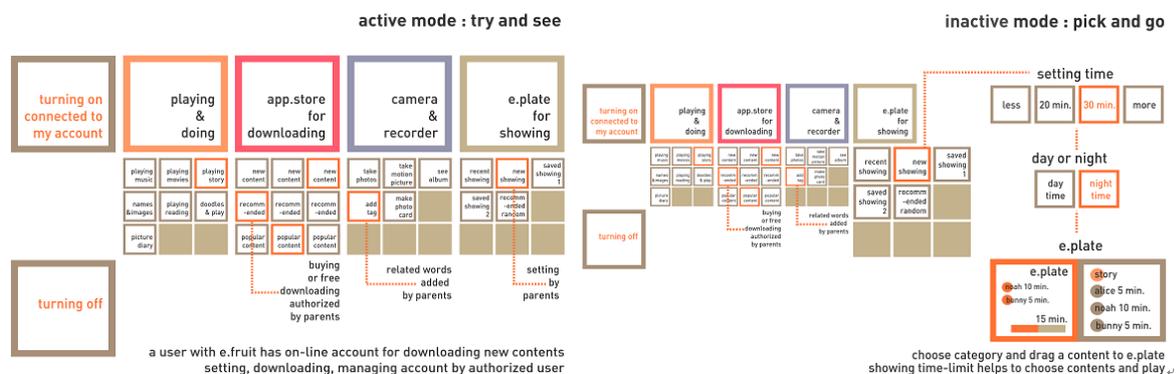


Figure.17 the task-flow of active-mode vs. inactive-mode

Active-mode could be used more frequently, but inactive-mode could be useful before sleeping or traveling.

With e.fruit, a user has an admin-account for setting, downloading or managing.

Random & variables: with e.tree and e.fruit, users can meet new experiences each time. Unlike information device for adults, having variable experiences is more important than information structure. Variables make it more various experiences. When children experience content flow, they can travel from one content to content by variables and reaction. Therefore, each time content flow becomes different.

4.3 Prototypes

Easy and customized service offers children to connect to good quality contents wherever. Presenting scenarios explain how it works. First is “Playing with Story” active-mode for 3-4 year old children group. In this scenario, while a child is reading a story, story can be modified by linked words to the story. The story consists of story modules, which is motion illustration and short sentence, and it is connected to card-play and kid-dictionary. A child can add personal image and drawing to the story module, and the mother supervise a child together. Second scenario is active-mode “Playing names, say it” for 3-4 year old children. Children play with word cards with linked sounds and descriptions and images. The words of cards are from the story which they are reading.



Figure.18 Scenarios 1 & 2

Third scenario shows that a 5-6 year old child plays with e.fruit in active-mode. From story module to doodle and illustration diary, a child learn alphabet and add doodles and photos to make the DIY content to share on-line. Last scenario is inactive-mode for nighty-night reading. It shows how to set for bed-time reading.



Figure.19 Scenarios 3 & 4

To keep the identity of the service, color plan is important to keep it similar look. Since this service carry various children’s contents whose colors are vivid and lively, using neutral color is necessary not to conflict each other. The keywords for color are playful, festive, fanciful and bright, and picked 5 subordinate colors and 1 dominant color for the color palate which feels dynamic but soft. For the top menu, each category is represented by color, and let users customize their e.fruit. Basic content categories are 9 including reading books, name & words, e.store and so forth. Users download contents from e.store, and the contents downloaded go to the each category directly.



Figure.20 content design for service

5. Conclusion

To use U environment for children's edutainment tool, I researched children's behaviors and environment and interaction with media to come up with ideas for the experience service model. Service model should be based on media-ecosystem which includes content provider, network service provider and product manufacturer. Also filtered good content pool offers downloading service to extend the function of the device. Downloading service also allows users to upgrade the device by children's age. Three types of content in e.tree, story content, information content, and idea content can be mixed for one content and allow users to travel from one content to another. The service structure and service design can lead for possibility of creative interactive media for children in the future. Based on the study, it will help understand the idea of how children, users, can use interactive media as an edutainment tool in U-environment.

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