An Exploratory Study on the Content Design of Mobile Edutainment for Preschool Children

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Abstract

As there has been a recent increase in the number of children who use edutainment content based on smart devices, the current study conducted an exploratory research to identify the design factors of smartphones and tablet PCs that influence the usage of mobile edutainment content for preschool children. Semi-structured interviews with 20 females who are mothers of preschool children revealed that aesthetic factors, such as characters, color, and the expressional form of symbolic icons included in the edutainment contents, sound, ease of use, story, and interactivity had significant effects on children’s preference and intention to use edutainment. This study provides the planners, producers and marketers of mobile edutainment content for children with a guideline on which aspects of the content they need to place emphasis on when producing edutainment content. However, in the future studies, it will be necessary to provide quantitative results by carrying out an empirical study.

Keywords: Edutainment content, Content for children, Mobile content, Smart Content

1. Introduction

The most frequently used content through smart devices is edutainment content, which has a market size reaching 15.2 billion dollars [1]. Following an increase in the number of preschool children's usage of smart devices like smartphones and tablet PCs, the development of smart contents for children has been triggered [2]. Among the smart contents for children, the most popular is edutainment content. Because edutainment content can elicit children's inner motives and immersion, its importance as a learning tool is growing bigger. In addition, edutainment content intends to naturally improve the learning effect by using a form of 'play' instead of directly exposing its study purpose. Considering the distinct characteristics of the children’s age group, including the incapability to carry heavy objects or do complex manipulations, the expected effect for the content based on smart devices, with a guaranteed mobility due their small sizes and weights, is even bigger [3].

However, among the previous studies on edutainment content, there has not been much research on the content for preschool children based on smartphones [4]. In the past research, the approach has been mainly from a perspective that looked at the contents that were not much different from the contents for adults on the whole without understanding or consideration of children's developmental stages, or from an adult and

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a middle or high school student's point of view [5]. Nevertheless, children have
developmental characteristics that differ from adult users; therefore, in order for
edutainment content to effectively facilitate children's learning, no matter how
thoroughly education contents are organized, building the content based on the
cognitive developmental stages of children is essential. Since children's special
developmental states such as short concentration and attention times and less developed
athletic abilities are largely different from adults’, a research for children is necessary
[6].

Hence, although it has been a long time since a lot of discussions on edutainment
were actively conducted, there has not been much research on the edutainment content
with a consideration of the devices children use and the changed trend of contents [7].
Accordingly, through an exploratory research, the current study reveals the design
factors that influence the usage of mobile edutainment content for children with smart
phones and tablet PCs. The research question of this study is as follows:

Research Question: What are the factors that influence the intention to use the mobile
edutainment content for children?

2. Related Research

2.1. Edutainment Content for Children

As a compound word of education and entertainment, edutainment refers to learning
content that enables learners to have fun while learning, as in playing games. Unlike
general games, edutainment aims to reinforce the motivation for education and raise the
learning effect. Instead of being limited to the game function like serious games are,
edutainment incorporates educational textbooks, materials, toys for children, robots or
machines for learning, and even offline board games [8]. However, the definition of
edutainment for children based on mobile devices needs to be reestablished depending
on what purpose it conveys. From the perspective of educational engineering, edutainment is used as a tool for instructional design, and in this case, since the
education is the first goal above all, edutainment content is understood as something
that achieves the educational purpose and offers enjoyment along with the education.
Hence, it can be said that edutainment, which is the educational content that processes
educational activities and entertainment activities into digital and multimedia contents,
formally claims to support educational principles, but in the aspect of the content, it
reflects learning principles [4].

In order to categorize edutainment content for children, S. H. Ahn and S.M. Song
categorized it into education game, animation storybook, cyber museum, digital
experience center [2], while Y. I. Park (2006) divided it into education game,
productivity, animated storybook, and multimedia reference, demonstrating the attempt
to include the productivity, which helps children users’ creation [3]. H. W. Park’s study
(2012) suggested a categorization of edutainment with the exclusion of digital content
in a dimension of teaching materials: game, integrated child education material, picture
book, home discipline, and teaching material for teachers [9]. In other words, because it
is not possible to see the results of the previous studies by the classification of devices,
the past research is inappropriate to separately look at the edutainment based on mobile
smart devices.
2.2. Characteristics of Preschoolers

A lot of research has been conducted on edutainment content for preschool children from the perspective that it is multimedia content with a basis on computer. However, only the content design and background theories for learning have been emphasized, rather than the users. Study on edutainment content for children first requires an understanding of the users of the content, namely, preschool children’s cognitive and physical abilities.

Since visual and perceptual development is achieved during early childhood, it is necessary that learning during this time period help the development of visual perception. Perception, which is the ability to integrate and understand different patterns of stimuli, is a cognitive process where a person recognizes objects through their sensory organs. This can be said to be a fundamental process that provides a basis for children’s cognitive and emotional domains [10]. The components of visual perception are divided into Visual-Motor Coordination (VM), Figure-Ground (FG) Discrimination, Perception of Perceptual Constancy (PC), Perception of Position in Space (PS), and Perception of Spatial Relationships (SR). Among those constituents, Visual-Motor Coordination ability is an act produced by the coordination between vision and physical activity or a part of body, and it refers to a child’s reaction to some kind of stimulus. This ability is developed most between 3.5 and 5.5 years of age, and it affects children’s learning to write. VM ability also influences the basic manipulation abilities when using mobile devices. Figure-Ground Discrimination is a capacity to adopt a particular stimulus among countless other stimuli, and this is related to preschool children’s attention concentration ability. Development of this ability is essential for children not to be distracted by objects unrelated to learning. This capability is largely enhanced from 4.5 to 6 years of age, and it hardly improves after early childhood. In the case of children of early ages whose Figure-Ground Discrimination ability has not been developed yet, it is likely that when the screen of the content is complicated or there are too many stimuli in it, children cannot concentrate on only one of them and may feel confused. Perception of perceptual constancy is an understanding of the fact that properties of objects such as color, size, and location do not change. This ability is markedly strengthened in children aged 5.9 to 7. Through this ability, children can locate words or spellings they know within the content. Perception of position in space and perception of spatial relationships mean being able to perceive the relationship between objects and space in the room and grasp the mutual relations among them, and each of these two abilities develops from age 5 [11].

According to Piaget’s intelligence development theory, children aged 2 to 7 come within preoperational period. This means they are not able to control their behavior through logical reasoning, and they cannot understand the multiple attributes of objects through intuitive thinking. Another important characteristic of preoperational period is ‘Intuitive Thought.’ Among the evidence for the intuitive thought, which often appears during the preoperational thought period, are ‘ego centrism,’ which is being unable to think from others’ points of view, ‘animism,’ which is a belief that all the moving objects are alive, and ‘artificialism,’ which is an understanding that every object has been formed due to human needs. The fact that the sun in the sky in the TV program ‘Teletubbies’ has a face of a baby, and that many comic characters represent a variety of organisms other than humans such as animals and even inanimate objects is due to the capability of children to familiarly accept the objects as if they were alive, through animism.
The gross-motor development of children is progressed as children go through the whole period of early childhood, and it is after the gross-motor development that fine motor development starts. The age at which a child can operate mobile devices on his or her own is an age older than 5, which is considered a relatively old child age, and a child at this age can carry out various activities with his or her hands such as coloring or drawing [13].

3. Method

3.1. Participants

In this study, interviews were conducted with 20 females who have children aged between 4 to 8. The ages of the children varied as follows: four 4 years-olds, five 5 year-olds, five 6 year-olds, one 7 year-old, and five 8 year-olds. The children consisted of 7 boys and 13 girls. As the study was targeted at mothers who normally use smart devices to allow their children to watch edutainment content, all of the 20 participants possessed smart phones, and 14 of them also had tablet PCs like I-pad and Galaxy Tab.

3.2. Procedure

As an exploratory research that aims to discover the factors that affect the use of edutainment content for children, this study selected interview questions based on previous studies. Prior to carrying out the interview, we asked the participants how old their child was, and for those who had children aged from 4 to 8, we asked if they usually make their children watch edutainment content using smart phones or tablets. In the following semi-structured interview, the questionnaire was composed of eight questions: What factors of edutainment content they think influence their children’s intention to use the content, if their children have preferences for particular content depending on the character, if they have preferences for particular content depending on the color, which one of the two interaction methods on the menu, pictures or words, they prefer, if the size of the button influences their preference, what their children’s reactions are to the sounds, how they react when they can fully understand how to use the content and when they find it difficult to figure out how to use it, how their reactions differ depending on stories, and how they react when there is an interaction.

4. Results

4.1. Character

Among the responses to the questions about intention to use and preference for the mobile edutainment content for children, the main factor that was most frequently mentioned was character. Character was found to be a principal element that affects the use of edutainment content for children, regardless of its type, whether it being a plant, animal, objects, or imaginary character. The specific category of character that children preferred was different between genders. Boys mostly liked object characters such as cars, planes, and robots, while girls preferred human characters, especially princesses. Both boys and girls liked animal type of characters.

"My son is 5-year-old boy and he likes it when there are dinosaurs, robots and things like that. He exceptionally likes them. For toys, he likes automobiles, like mini cars,
more than dolls. So even when playing with the media, he likes those that have cars in them." – Participant 14 (female, age 4, age 35)

“He loves cars. He used to like Ta-yo these days, but it’s now gone. For characters...DDo-botis his favorite, and Top Blade, a character with a top, and he also likes a human character in a comic called Magic Hanja.” – Participant 1(male, age 6, age 35)

"DDo-bot is a name of famous robot in korea.

“She likes human characters. Her favorite is a princess character called ‘Sophia’ in an animation movie. She especially likes princesses.” – Participant 10(female, age 7, age 40)

“I think she likes human characters. Should I call it human? There are these characters that appear in the Tuntun English. Murphy and Sally... She really likes those girl and boy characters.” – Participant 9 (female, age 6, age 38)

4.2. Aesthetics

We asked the participants questions about the aesthetics of the edutainment content for children, including the color. About the color, we asked what color their children normally prefer and also if they have a main preference for color when selecting edutainment content. The analyzed results showed that the preference was altered depending on the main color constituting the background or characters in the content. Although preferred colors varied from child to child, usually, girls liked pink while boys liked blue. Other factors, such as the expression form of the symbols (usage of graphic elements) and the size of buttons, were shown to affect the intention to use and preference for the content.

“Kyueun(5, girl), since she is a girl, likes pink. Kyueun likes anything pink these days. Images, clothes, toys, or anything.” – Participant 20 (female, age 5, age 42)

“Yewon likes pink most. Obviously, 8-year-old girl is neat and girlish. Her favorite thing is the princess character that she likes, and princess relates to pink. I think color is important, but character is also important.” – Participant 11 (female, age 8, age 33)

“My child likes blue, red, and black. Color has a huge impact. If the same car is in yellow and red color, of course he wants to buy the red one. For things like clothes, if there are yellow and blue, he likes blue. Color really influences preference.” – Participant 4 (male, age 4, age 39)

“It’s maybe because my child cannot read yet, but even when he came to be able to read, he prefers pictures. He catches on faster when there are pictures.” – Participant 4 (male, age 6, age 39)

“The things to press must be big, so that when my child selects something with her finger, other things won’t be pressed by mistake. It should be designed large.” – Participant 8 (female, age 5, age 32)

4.3. Sound

Sound is largely composed of effect sound, background music, singing along, narration, and so on. We first asked about preferences for various sounds when using edutainment content for children, and then asked if their preference for and intention to
use the content were altered depending on the sound. As a result, the sound within the content, such as the effect sound, the tone of narration, and background music, appeared to largely affect the preference.

“My children really like the effect sound, like “PyokPyok” sound when pressing buttons. They press it again and again to hear that sound. I think they like something more when it makes sound. When using the content, if the sound is off, my kids always ask me to turn it on.” – Participant 8 (female, age 5, age 32)

“When watching English content, kids find it really fun if it has many sounds, like wind noise when wind is blowing in a scene.” – Participant 19 (female, age 4, age 29)

“You know those sounds when playing games, like ‘Zing,’ the flying effect sound. Kids find them fun. Youngjoon (5 year-old, boy) likes it when he gets feedback sound for something he’s done, and Youngchae (7 year-old, girl) likes background music that goes on in the back.” – Participant 2 (male, age 5, age 40)

“First, sound is an essential factor. It draws kids’ attention. But kids like it even more when they hear sounds like their favorite robot theme song. They like theme songs, and also in a comic movie called Ttobot, there is this tone of voice that the driver often speaks with. My kids like it when they hear that tone.” – Participant 4 (male, age 6, age 39)

“Yewon likes background music. And Yewon also likes the sound that pops up when she touches the screen. She just finds the touching sound effect fun.” – Participant 11 (female, age 8, age 40)

4.4. Ease of Use

For the questions about the ease of use of edutainment content for children, we asked whether the child used the content alone or with his or her parents, and asked about the children’s reaction in accordance with the degree of ease of use. Although most parents reported that their children repeatedly use the edutainment only when the content is easy, ease of use is not always proportional to the intention to use, and there was also a response that if there are fun and interesting factors, children ask questions to use the content even if it is difficult. Therefore, there was no agreement made on the issue of ease of use.

“My kid uses it even if it is difficult. He likes it when something hard comes to work in the end.” – Participant 1 (male, age 6, age 35)

“This is an important matter for young children. If something’s hard, kids ask for help to people around them like their parents, but if they try and it still doesn’t work, they can’t do anything about it. It’s very important. In the end, they can’t do it without help...” – Participant 4 (male, age 6, age 39)

“If my child finds it hard, he tries it on his own first time and says ‘Help me, mom.’ When I say I can’t do it either, he still keeps on trying to figure it out... Anyways, he tries several times, and if it still doesn’t work after a few trials, he gives up.’” – Participant 19 (male, age 8, age 42)

“No matter if it is easy or hard, if it’s fun, he does it even if he has to go through several trials. They don’t know how to do it when they first use the content. Even if it is difficult, they tend to thoroughly read the manual and do it.” – Participant 12 (female, age 8, age 40)
4.5. Storytelling

Results obtained from asking participants if their children understand stories and if the children have stories that they especially like revealed that preschool children can understand stories and that their preferences were influenced by whether the story is one they liked. However, a consensus on the particular stories children like was not reached.

“My kid doesn’t have any particular book he likes. But maybe because he is still young, he likes those books that explain things like ‘Ay, it’s dirty,’ ‘Ah, it’s clean’ and that have stories about poo. He finds them very funny and interesting. He likes stories related to excretion so much.” – Participant 4 (male, age 6, age 39)

“Dinosaur stories? And tiger stories as well. You know, the old stories, like traditional fairy tales. I think he likes it when the strong teases the weak. He seems to like the critical situation where the weak is tortured or is eaten up by the strong.” – Participant 3 (male, age 8, age 39)

“He likes traditional fairy tales. For example, Heungbu and Nolbu story. He laughs loudly and likes it when the greedy character is scolded.” – Participant 8 (female, age 5, age 32)

4.6. Interactivity

After explaining the participants about the meaning of interactivity and providing them with examples of interactivity, we asked them about their children’s attitudes towards interactivity. The responses to questions about interactivity of contents for children including edutainment content have shown that overall; interactivity is an important factor for all the children. Especially, in the case of children of early ages, children like the fact that they get feedback from the system when they press the buttons or icons, even if they would not know what meaning it contains; however, children of relatively old ages understand the meaning of the reaction and like it.

“8-year-old child voluntarily presses this and that, but 4-year-old likes the act of touching the device itself, rather than utilizing it. The young child doesn’t really use the content. She wants to press it simply because she sees her sister do it, it’s not like she makes good use of it.” – Participant 11&12 (female, age 8&4, age 33)

“My child likes something that makes sound when she presses it. Or something that makes a funny facial expression. She finds that reaction interesting.” – Participant 13 (female, age 6, age 38)

“My child likes something that reacts. Like, when you touch something, it makes sound like ‘Ouch!’ She likes that kind of reaction. Also when she says something, the system imitates her. She finds that imitation very fun.” – Participant 1 (male, age 6, age 35)

5. Literature Review on the Drawn Concepts

5.1. Character

Character, from its dictionary definition, means a visual symbol, like a functional figure or animal, that represents a particular trademark and that is created to convey a certain feeling. Characters are often applied in the edutainment content for children
with the expectation that the natural communication between users and characters that are similar to humans will improve the human-computer interaction and make the interaction convenient [15]. In S. Y. Yoo’s research, children’s character preferences were explored by dividing the characters according to expression motives: animals, products, inanimate objects, figures, and plants. In this study, animal characters had the highest ratio of 62%, while products and inanimate objects each had about 10% preference rate [16], overall demonstrating that characters are meaningful in the contents for children. S. J. Won categorized characters by materials of expression, forms of expression, color, production methods, line, and movement of place, movement, body type, and size and observed them in detail. As a result, it was revealed that in the materials of expression category, people prefer animals, and the most preferred was a character in pastel and primary colors, in 3D, expressed with a bold line, and big size with the face-body ratio of 1 to 3 [15].

5.2. Digital Storytelling

Storytelling, a compound word of story and telling, refers to the ‘activity of telling stories.’ With the development of information technology (IT) and multimedia, conveying stories is done not only through speech or writing, but also through various methods such as letter or graphics, sound effect, and touch or gesture interactions through smart devices. Reflecting this change in trend, a storytelling carried out through digital media is referred to as ‘digital storytelling’ in a broad sense [17]. Digital storytelling arouses users’ interest, makes them concentrate, and elicits motivation. These merits of digital storytelling help users structure and integrate thoughts, allowing an easier understanding of the complex content and enabling the construction of the content as not just a list of sentences, but a semantic structure [18].

Storytelling in edutainment is more effective when it is targeted at children. The reason for this is, first, the early childhood, which includes children aged, 3 to 8, is when language acquisition is actively progressed. Stephen (1998), who studied the effect of storytelling on the learner’s communication ability, found that storytelling helps improve the learner’s vocabulary [19]. In addition, when education through storytelling was conducted to preschool children with disabilities, the ability to re-tell the story was enhanced, demonstrating the role of storytelling as a means to increase the efficiency of learning [20]. Secondly, storytelling enables learners to naturally acquire the information and elicits learners’ interest so that they can absorb the learning content while having fun. This aspect is important in that preschool children can easily familiarize themselves with difficult contents or learning while enjoying the process of learning as if they are playing games [21].

5.3. Aesthetics

When producing edutainment content for children, in order to plan content with a high visual aesthetics, it is necessary to examine if the buttons and menus are composed in sizes appropriate for children’s physical characteristics, and to reflect this in the structure of the content. Existing research on design of content for children were mostly about the interface design of the content based on PC [7, 22, 23]. However, as the cases of children’s using edutainment content with small smart devices like smart phones and tablet PCs have increased in number, research on the usage of content in small environments with small screens and small menus and buttons is required. Content for children should be designed in such a way that stimulates the sense of sight, thereby
eliciting their interest. Also, the movement of the main objects must be clearly distinguished from the background, and the visual complexity should not be high. The amount of texts appearing on the screen should be minimized, considering children who cannot read, and the font of the text needs to have a shape that can arouse children’s interest and be written in an appropriate size [7, 24].

5.4. Sound

The fact that sound effect plays a role of evoking a high level of interest and awakening children has been acknowledged in the previous studies [24]. Listening to explanations through auditory senses allows children to have rich experiences, makes it easier to remember compared to those suggested only visually, and it also provides a powerful strength with which children can resist distractions. Hence, when designing edutainment content for children, it is important to include not only visual stimulation, but also auditory stimulation, so that children can use multiple senses. The sound effects used in edutainment for children can be largely categorized into four: sound feedback, background music, narration, and song. Song refers to a design where children can sing along the lyrics of the song with the provided music. Songs serve as an effective tool that allows children to reduce the burden of study and have fun while learning the educational content [25]. According to Piaget’s Intelligence Development Theory, because children in the sensor motor period rely on visual or auditory senses until they become able to read, the auditory stimulus, the sound, is important for children [26].

5.5. Ease of Use

As an important factor that determines the acceptance intention of technology, ease of use has established itself as a core element in several models including TAM (Technology Acceptance model), TRA (Theory of Reasoned Action), and UTAUT (Unified Theory of Acceptance and Use of Technology) [27]. Ease of use and ease of learning have been found to be meaningful elements in user evaluation of mobile devices [28], and previous research has also revealed that in the case of using educational content based on PC and mobile devices, ease of use positively affects the intention to use or learning satisfaction [29].

5.6. Interactivity

From a functional aspect, interactivity can be defined as offering a person-to-person communication through a communication channel and exchanging stimuli between human and machine [30]. Most of the concepts of interactivity have the element ‘user manipulation’ in common [31]. In a previous study, interactivity has been considered as an important factor in mobile learning [32], and it has been found that it is important to consider children’s finger sizes when designing content for children so that children would not experience any discomfort when they use the content by touching the screen on their own [33]. From these research results, it can be predicted that interactivity helps improve the task performance when children undergo learning through the edutainment content for children.
6. Conclusion

In this study, interviews targeted at females who have preschool children were carried out in order to investigate the significant factors that influence the use of edutainment content for children based on mobile devices. The analysis of the results has shown that, first, characters have a significant impact on children’s preference for and intention to use the edutainment content. Secondly, the color, such as the color of objects included in the content or the color of characters, had a significant influence. Along with the color, factors like the size of buttons and menu buttons expressed as pictures also had a significant influence. Thirdly, it was demonstrated that sound also significantly affects children’s preference for and intention to use the edutainment contents. Fourth, ease of use was proved to be meaningful components for children. Fifth, story had a significant influence. Finally, interactivity was significant as well. However, the results obtained from this study about each factor showed differences depending on gender and age.

In the current time period at which edutainment content for children and children who use the edutainment content have both increased in number, this study is meaningful in that it shows what the major factors of the content that affect the children’s preference are, thereby suggesting the producers and designers of edutainment content for children the specific elements on which they need to put emphasis when creating the content.

Nevertheless, like most of the research on content for children, the current study was performed with the mothers of children instead of the children, the actual users, due to the fact that children, considering their developmental stage, are unskilled at expressing themselves. This leads to a fundamental limitation that mother’s opinions may differ from the actual thoughts the children have. Furthermore, since this study is an exploratory research carried out with a sample number of 20 participants, which can be considered a small number, it is somewhat insufficient to generalize the results to the entire population of preschool children. In addition, most of the participants in this study were the parents of children aged between 4 and 8 living in Gangnam, Seoul in South Korea where there is a special tendency for parents to have high interests in their children’s education. As a result, another limitation may be that such regional characteristics were not controlled in this study. Therefore, in the future studies, it will be necessary to conduct an objective, quantitative analysis with a larger sample size and with participants from diverse regions.

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References