Kid Mode on or not? A Critical Analysis from Perspective of Child-Computer Interaction

Mohan Xu

Beijing University of Technology, 100 Ping Le Yuan, Chaoyang District, Beijing, China
xmhbjut@163.com

Abstract: Children now use leisure software more and more frequently through electronic devices such as mobile phones, computers, and tablets. Therefore, it is particularly important to solve the problems that arise when children interact with computers. Most of the leisure software are also commonly used by adults. Although most of these software have child protection mechanisms (such as the kid mode), due to some shortcomings in their functions and interactions, the needs of parents and children cannot be fully met. How to solve these defects is an important issue. In this article, we examined how to further develop these deficiencies dependent on the standards of the principles of participatory design and user-centered design. We first divide these deficiencies into two types, namely, the inability to meet the needs of children and the inability to meet the needs of parents. Next, we put forward our suggestions for these defects from the three perspectives of functionality, interactivity and visual communication. Finally, we found that our research has certain limitations and raised expectations for future researchers.

Keywords: Child-Computer Interaction, Kid Mode, Critical Design

1.   Introduction

With the development of computer technology in hardware and software fields, children nowadays get in touch with more and more intelligent devices and social media [1]. Excessive use of these electronic devices may adversely affect the children themselves and their families [2-3]. To prevent children from being harmed by the overuse of electronic devices and the inappropriate content on the Internet, some countries, like China, have taken regulation [4] to limit the content and time available to the kids. However, these efforts have little effect due to complex reasons [5]. Some people even gain benefits by helping children break through the limitation. Instead of strengthening the restrictions, developing appropriate products that good for children seems more necessary and meaningful.

Although there are plenty of distinguished studies [6-8] about the problems of the current efforts, few papers have given the solutions to solve the problems. There are also findings of design methods of human-computer interaction, but they cannot just be used to solve the problems when designing software for children. One more step should be made in the field of solving problems related to child-computer interaction by critical analysis, and this paper tried to fill the gap in this area.

This paper is going to talk about the issue of Child-Computer Interaction (CCI) from the perspective of methods of designing appropriate products for children. To illustrate the problems of child computer interaction and its solving methods, this paper will be divided into five parts as following. The second part of this paper will be a literature review, we will discuss the problems of

current apps have then children interacting with computers. The next part will be the main body, we will talk about how to design an app that perfectly meets the children' s needs. Then, we will discuss my results and issues that still need to be solved by future research in the results and discussions part. Finally, I will conclude this paper in the conclusions part.

2. Literature Review

2.1. Definition & Development Of CCI

Child-Computer Interaction (CCI) is a space of logical examination that concerns the peculiarities encompassing the association among kids and computational and correspondence advances. It joins data sources and viewpoints from different logical disciplines illuminating and supporting a space of exploration and modern practice that concerns the plan of intelligent frameworks for kids [9]. As a multidisciplinary research field, CCI is straightforwardly associated with a few examination regions (e.g., brain science, learning sciences, cooperation configuration, designing, software engineering and media studies) [10].

The commencement of CCI as a field of exploration originates from the 1960s [11-12] while spearheading specialists, for example, Seymour Papert, Edith Ackermann, Marvin Minsky, and Alan Kay investigated the plan of PC frameworks for youngsters. An expanding number of CCI related distributions began to show up at a scope of general HCI and learning gatherings toward the start of the 2000s, this supported the foundation of the International Conference on Interaction Design and Children (IDC) in 2002 [13]. In 2013, two of the initiators of the IDC meeting series (and co-writers of this publication), specifically Panos Markopoulos and Janet C Read, drove the foundation of the International Journal of Child-Computer Interaction (IJCCI) as a devoted diary for CCI research [10]. In 2020, Antle et al. examined the substance of the ACM Interaction Design for Children (ACM IDC) meeting [14].

2.2. Design Principles

There are many design principles in human-computer interaction design. These principles make our (designers) design process more convenient, and the products we design better meet the needs of target users. Next, I will introduce several important design principles in the field of child-computer interaction, namely participatory design and user-centered design.

Participatory design (PD) was brought into the world in Scandinavia and was initially called cooperative design. The history of PD could date back to the 1970s, research projects in systems development have user participation [15]. In the Utopia project, the significant accomplishments were the experience-based design strategies, created through the emphasis on involved encounters, underlining the requirement for specialized and hierarchical other options [16]. The parallel Florence project began a long queue of Scandinavian examination projects in the wellbeing area. Specifically, it worked with medical caretakers and created approaches for attendants to get a voice in the improvement of work and IT in clinics. The Florence project put sex on the plan with its beginning stage in a profoundly gendered workplace [17]. In 2008, Hourcade situated the Scandinavian Participatory Design custom with the Utopia project as a promising systemic methodology for CCI research [18]. In 2013, Iversen continued the research of Hourcade and pointed out the values and issues in the CCI Utopia project [19].

Besides PD, Sanders kept the idea that User-Centered Design (UCD), should be another important theory and principle while doing CCI design [20]. Also, User-Centered Design takes motivation from Participatory design. User-centered design (UCD) or user-driven development (UDD) is a system of the cycle (not confined to interfaces or innovations) in which usability goals, client characteristics, environment, assignments, and work process of a product, administration, or

interaction are given broad consideration at each phase of the design process. There are necessary tests [21] for the designers of an item to see naturally the initial time clients of their design experiences, and what each user's learning curve may resemble. The user-centered design depends on the comprehension of a client, their requests, needs, and encounters and when utilized, is known to prompt expanded item helpfulness and convenience as it conveys fulfillment to the user [22]. The expression "User-Centered Design" was instituted by Rob Kling in 1977 [23] and later took on in Donald A. Norman's research lab at the University of California, San Diego. The idea turned out to be generally famous because of the distribution of the book User-Centered System Design: New Perspectives on Human-Computer Interaction in 1986 [24]. Norman re-visitations a portion of his previous plans to expound on what he had come to find as excessively reductive in his book in 2003 [25]. In 2019, Tsvyatkova emphasized the importance of UCD in CCI designing by making experiments with children in different age groups [26].

3. Problems Found In kid Mode In Leisure Apps

In order to investigate what kind of software the children mainly use nowadays and identify the research object, an interview was conducted with parents of children under the age of 12. Two questions were asked. First, what software the child usually use. Second, do they think there are any problems of these apps. The results showed that there are four types of software most commonly used by children nowadays, namely learning software, video software, social media and games. Unfortunately, the children did not provide any valuable answer to question two by saying "No".

Table 1: Apps children commonly use nowadays.

Type	Test case	Description
Social Media	Weibo	Weibo (Microblog) is a transmission online media and organization stage dependent on the sharing, dispersal and securing of client relationship data to share short and continuous data. Similar to Twitter.
	Xiaohongshu	Xiaohongshu (Little Red Book) is a way of life stage and an entrance for buyer independent direction, where numerous fashionistas share their ways of life.
Short Video	Douyin	Douyin is a music imaginative brief video social programming brooded by ByteDance. It is a brief video local area stage for all ages. It is the Chinese rendition of TikTok.
	Kuaishou	At first, it was a portable application for making and sharing GIFs. In November 2012, Kuaishou transformed from a dusty instrument application to a brief video local area, a stage for clients to record and share creation and life. Similar to TikTok.
Long Video	Iqiyi	Online video site. Similar to Youtube.
	Tencent Video	It is an internet-based video stage with famous substance and expert media activity abilities. It is an extensive video content stage that totals hit motion pictures, amusement, games, news and data, and so on, and through PC, versatile, and lounge items, and so on This structure furnishes clients with superior quality and smooth video amusement experience. Similar to Youtube.

Since games are almost banned to children by the government in China [4]. There are also few kids who would take the initiative to study alone on their cell phones or iPads. As a result, this paper will focus on the issues that happen when children use leisure apps. There are few leisure apps that were designed for children only, and therefore, they have to use the same apps with us. Table 1 below shows the apps children commonly use nowadays.

It is easy to find from the table that all these apps share the same child protection measure, kid mode. The kid mode refers to the "youth anti-addiction system" piloted on the main short video platform and live broadcast platform led by the National Internet Information Office in March 2019 to regulate the online behavior of minors. The system will regulate the online behavior of minors in terms of usage period, duration, functions, and browsing content.

There is a common ground of kid modes in selected researching apps, that many functions were locked. In long video apps, there will be a quite different user interface in the kid mode and the recommended content will be all kinds of cartoons. While in short video apps and social media, the contents focus only on education, foods, and nature.

Four kinds of shortages were found when using these leisure apps with kid mode, usability flaws, content recommendation defects, functional defects, and low usage. And they can be concluded in two types. First, apps with kid mode failed to satisfy the kids' needs (shortage one and shortage two). Second, the kid mode was inconvenient for parents to use (shortage three, four and five).

Shortage one: In long-time video apps, the search bar could not be found, which means a child has to swipe the screen for a long time if they want to watch their favorite cartoon which may not be displayed on the top. Although there is a tip saying that Siri could be used to search my content, but after trying, the success rate was zero.

Shortage two: In short video apps and social media, some contents are inappropriate. For example, there are some content teaching a second foreign language or how to prepare for the College entrance examination, which is a little bit early for a child who needs kid mode.

Shortage three: Besides, in some apps, the mechanism of kid mode has 'bugs'. If the limited time is fully used, it could not be increased instead of turning off the kid mode. But after turning on the kid mode again, the app still cannot be used. That means a child could not use the app after a limited time even if their parents allowed it. If they have to use it, kid mode has to be turned off, and therefore, kid mode lose its value.

Shortage four: Although most of the software provides a pop-up window to open the kid mode when it is first opened, it does not specify the content in detail, so that parents cannot fully understand the functions of the kid mode. If the kid mode is not turned on when the software is used for the first time, the entrance to the youth mode will be hidden and difficult to find.

Shortage five: Low usage is a common problem of kid mode in all kinds of leisure apps and the reasons could be many. This phenomenon mainly occurs in older kids who understand the amazing world behind the "wall" of kid mode. At their age, they have the ability to download apps by themselves and have more privacy awareness than younger kids. As a result, it is hard for their parents to control the apps they use. For younger kids, they usually do not have their own smart devices and that means they mainly use their parents' phones or pads. It is complex for parents to turn on the kid mode at any time they hand their phone to their little kids. Considering that little kids cannot search things alone and is easy to supervise, many parents choose not to turn on the kid mode.

4. Suggested Solutions

To improve the defects of the kid mode that have been mentioned above and offer kids a better user experience, we will give suggestions from two aspects, functionality improvement, and interactivity improvement.

4.1. Functionality Improvement

The first potential improvement will be authentication mechanism. If the goal is to help parents manage the kid's using time or keep kids away from inappropriate content, the kid mode system should be improved on its mechanism. For example, when new software has been downloaded, users are not able to use it without login and real-name authentication. If the authentication system finds the user is a kid, the kid mode is enabled by default and cannot be turned off until the kid attain the full age (similar to some games in China nowadays) [4]. If the user is an adult, a face-scanning authentication is still needed when opening the app each time or viewing sensitive contents (similar to some bank apps) [27]. Under these circumstances, although the target users of the kid mode are

kids, the purpose is to satisfy the parents. As a result, participatory design and user-centered design are all useless. We can copy the existing protection mechanism directly.

The second point is personalization. As human brains grow rapidly in the childhood period [28-29], cognitive ability and psychological maturity differ hugely from different kids [30]. Some parents may only want to limit the time their kids spend on the phone, other parents may allow their kids to play whenever they want as long as the contents are appropriate. In this case, we suggest that there should be a wide choice of the function of the kid mode. It should be able to choose only the time limit or content limit. The time limit should also be available to personalize. As to the content, we hope we can input our kid' s physical conditions (age, gender, etc.) and get an appropriate personalized recommendation content.

On the other hand, we should consider the content pool. As we mentioned in the last part, kids' brains differ markedly from each other. The definition of "appropriate content" to different kids should also be different. Cartoons and lessons are not the things or the only things kids want to see. They are what parents want kids to see. If our goal is to satisfy kids by offering them a better content pool they want even if the kid mode is on, we have to introduce participatory design. Through matters like interviews or questionnaires, we can to some degree get what kids of different conditions want to see and that should be the resource of the content pool. Experts (educational, child psychological, or other related subjects) should also be invited in the design progress because kids' needs may be inappropriate and could be harmful to their growth based on some researches. In PD progress, experts should play the role of an inspector of the content pool proposed by kids. Parents could be allowed to the PD progress and express their views. But the final decision should be made by experts.

In addition, we can build efficient feedback channel. In order to reduce functional defects, companies should appropriately increase the number of testers in the R&D department of the kid mode, so as to reduce the number of defects as much as possible before the product is launched for the first time. At the same time, companies should open efficient feedback channels so that experts and parents can provide timely feedback on the problems encountered during the use of the child model, and the R&D department can handle them in a timely manner.

The following is a combination of the above suggestions. As different parents have different needs, the kid mode system should be highly personalized. After the app is downloaded, no sensitive content should not be able to view until login and authentication (if needed). Then parents should be able to choose different types of limitations due to their kids' condition. Then the content pool offers the best appropriate content decided by kids and experts.

4.2. Interactivity Improvement

The first potential improvement will be completeness. Although kids of some age may do not have the ability to search actively, there is no reason to deprive their rights. Not to mention more kids can search by themselves. As a result, there must be a touch bar.

Care for different children is also important. For some young kid who knows the little words, we suggest providing some caring design. Auxiliary functions like the phonetic alphabet or text reading can help young kids understand the icons. Voice input can help young kids search for things they want. Icons could be different when setting different ages. There should be fewer words and more highly realistic icons.

There also should be clear notification. We suggest that when the software is first opened, the pop-up window of the kid mode can clearly inform the concise and clear content of the kid mode, and it needs to be read and confirmed before continuing to use. If the software wants to simplify the booting page and save opening time, it should inform the user of the opening method of the child mode through animation or pop-up window, so as to avoid the user spending time searching for it when they want to open it in the future.

4.3. Visual communication

We suggest using the knowledge about color mood. Numerous studies have confirmed that color can affect people's mood [31-32], and this conclusion is also valid for children [31]. Bright colors such as yellow, orange, and red are related to joy. Compared to dark colors, light colors are easier to relax [32]. Therefore, we suggest using brighter colors when designing the kid mode interface to enhance kid's sense of relaxation and pleasure when using the software, which will not only promotes children to exercise their thinking and enhance creativity, but also allows parents to clearly know whether the kid mode is turned on. As a result, the kid mode is expected to transform from a simple restriction on children's use to a function loved by children.
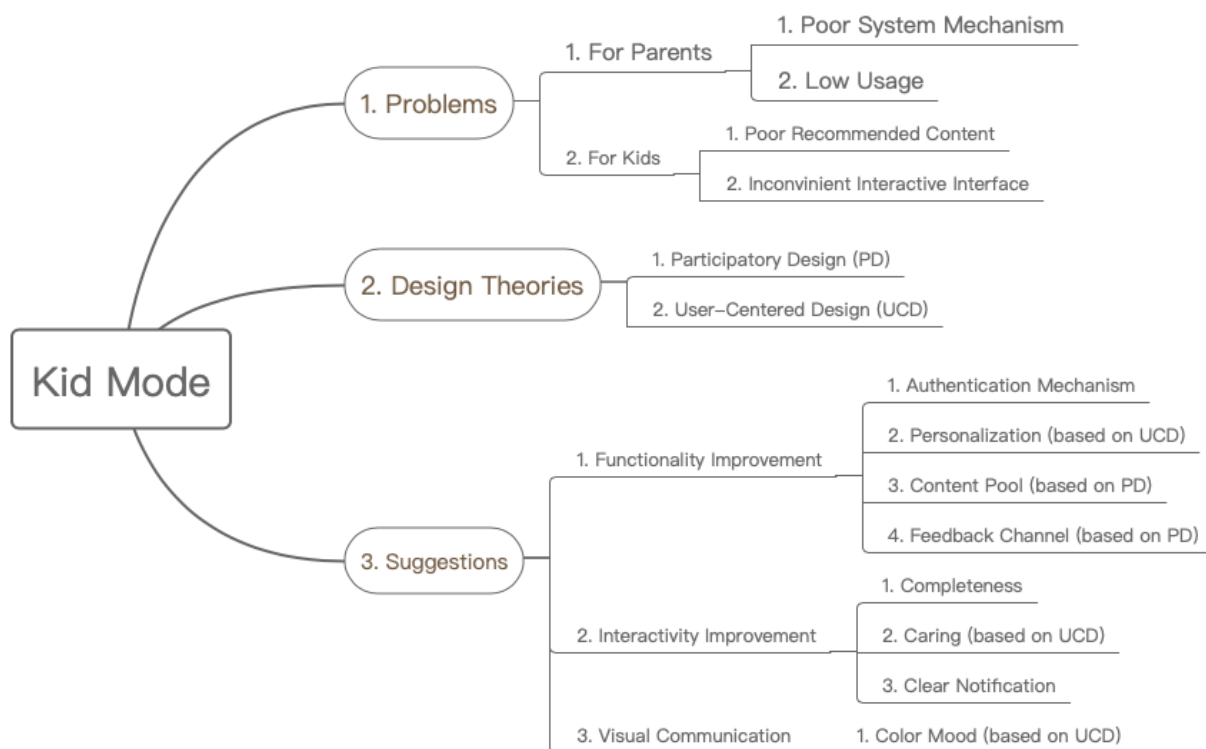
5. Conclusions

Figure 1: The frame of the article.

In this article, we have attempted to find the possible improvement for kids in the hot leisure apps nowadays. As shown in figure 1, this article first defines the problem in child-computer interaction. Then, based on the two principles of participatory design and user-centered design, we found many flaws in the kid mode. Finally, we put forward some suggestions for defects and some areas that can be improved. The research provides some insights into both academia and industry. There are many excellent articles in academia expounding the problems that arise in children-computer interaction, and there are also mentioning ethical issues in the design process. At the same time, there are also many articles introducing design principles and design methods. This article combines the problem with the method by taking the youth model in casual software as the starting point, and gives an example for the practical problem-solving article. For the industry, this article provides a reference for Internet companies that how to improve the system mechanism, recommended content and

interactive interface display of the kid mode to improve utilization. So as to better meet the needs of children and parents, and prevent the kid mode from continuing to be in vain.

Since the subjects we interviewed are all Chinese children, it may not necessarily reflect the leisure software preferences of children around the world. At the same time, our software samples are not large enough, and there may be some problems in the kid mode in the software that have not been discussed. The kid mode mainly appears in Chinese software, but it does not appear in some foreign software of the same type. Therefore, this research does not have reference significance for all Internet companies in all countries. We suggest that future researchers can conduct research and make suggestions for children in their own country and the software they commonly use according to the national conditions of different countries.

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