

Participatory Design with Preschool Children: A Smartphone Application Concept

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ABSTRACT

This paper presents experiences of the design process of a mobile application concept addressed to children of 5-6 years old. The work was an attempt to approach an interaction design problem from a child-centered design perspective within the scope of a student project. The project was realized during an 8 weeks course run by the Gothenburg Working Group for Interaction Design and Children. Several methods aimed for the intended user group were employed and adapted for the project's needs, such as "Mission from Mars" and peer tutoring. The process involved participation of young users in co-design and evaluation sessions, that both took place in the natural setting of a preschool. A concept for a Christmas calendar application was developed during the project. The application consists of simple click and play mini-games, that are revealed day-by-day as time progresses. The games aim to encourage children exploration and counting skills as well as they build continuous narrative around Christmas related characters. The project was aimed to apply child-centered methods and to learn from their realization in context of a concept development of an application addressed to children.

Author Keywords

Interaction design and children; participatory design; Christmas calendar, smartphone application concept.

INTRODUCTION

Our society developed over the last century towards consumerism and during this transformation children too have gradually been acknowledged as a relevant consumer group. The attempt to cater to children's specific needs has brought about more than just opportunity for manufacturing new products and goods, it also has brought new inspiration in technology design such as that of the first mobile computer, the Dynabook [8].

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While children were recognized as a consumer group, the process of designing for children has not traditionally involved them as active stakeholders. A child's role in the design of new technology has historically been minimized partly due to preconceptions such as the traditional power structure of the "all-knowing" adult and the "all-learning" child [5], due to concrete limitations such as the difficulty of verbalizing their thoughts, especially when it concerns abstract concepts and actions [11, 12], or simply because children's extremely honest feedback and comments concerning technology need to be interpreted within the context of concrete experiences [4].

Recent developments in information technology have made smartphones, tablets, and other connected devices widely accessible in western societies and therefore contributed to children becoming familiar with technology since early infancy. For close to a decade now, children are referred to as "digital natives" that emerged as an important new consumer group of technology [6]. In this context, the engagement of children in participatory design is an ever more accepted approach in designing for children.

This paper describes an experience of a concept development process involving 5 year old children as design partners. Through their contribution in the co-design and evaluation phases of the process they have helped define the final design concept of a Christmas-themed calendar application that uses storytelling through mini-games centered on learning and discovery.

SIMILAR WORKS

As the concept emerged from the participatory activities with the children, other Christmas calendar smartphone applications already on the market were investigated. Most of them are simple application advertisements that present different applications each day until Christmas Eve. There are at least two applications that have similar theme as this project, Elf Advent(ure) Calendar [13] and Binny's Advent Calendar 2013 [1].

Elf Advent(ure) Calendar [13] is an Android application aimed for children. It is a text based advent application including new mini games each day and a story in which the child will help the elves to save Christmas. Binny's Advent Calendar 2013 [1] is available on both iPhone/iPad

and Android and is also presenting a new mini game each day in a unique illustration style, but does not have a specific storyline to follow.

This project has a somewhat different focus than what can be found on the market today. It pays an attention mainly to exploration and curiosity, and it shall provide these values in a creative way using mini games as an exploration tool to guide the children through each day.

METHODS AND PROCESS

The novelty of working with children as design partners first required a phase of research beyond the realm of children development theory. Individual observations of children as technology users started prior to the first co-design workshop, foremost based on the "fly on the wall" approach. These interpretation-free observations provided a glimpse into the way children use smartphones and tablets. They also revealed, among other findings, that adults facilitate children's engagement with technology. In addition, to better understand the points of reference of our co-designers, a media analysis was carried out by targeting children TV shows, toy stores, and dedicated smartphone applications. Besides providing a personal insight to the context that the design concept was to be set in, the observations also offered a good introduction in the co-design phase of the participatory design process.

The co-design workshop was carried out in a preschool located in the Torslanda district of Gothenburg, where a preschool teacher helped to arrange a meeting with a group of 5 year old children.

The most important limitation identified during the workshop planning phase was that the children did not speak English while two of three member of our research team did not speak Swedish. While preparing appropriate probes in order for children to relate to the subject of our research, the language barrier was a weakness that was turned into a strength. Attempting to use the situation in our advantage we planned an adaptation of the "Mission from Mars" design method [3] where children were told that the two foreigners were on a mission to learn how children in Sweden play with smartphones in order to create applications so the children in their countries could also play in a similar way. The entire sessions were video recorded with focus on the children's activities and thoughts for later analysis.

The co-design workshop found three children drawing on low-fidelity paper wireframes representing smartphone screens in an attempt to show how they use smartphones to play, see figure 1. After they finished the drawing and coloring session, the children were part of guessing game where the foreign guests were trying to understand the meaning behind their drawings. Since traditional dialog was not an option, drawing was used as a common language in an exercise where the Swedish speaking member of the team was asking what each drawing

represents and translating the answer to English. In reply, one of the foreign members was drawing the representation and waited for children's validation.

One week after the co-design session the children took part in the second workshop which aimed to evaluate the prototype built based on the input they provided. The evaluation session was structured using the peer tutoring method [7], where children were presented with a high fidelity interactive prototype of a mini-game. The plan of this session was to have children first understand how to interact with the graphic interface and then to succeed in explaining to other children how to interact and complete the mini-game. The wider aim of this activity in the context of the project was to evaluate the difficulty of interacting with the narrow prototype presented, covering just one mini-game scenario in a design concept of 24 mini-games.



Figure 1. Co-design session with the children.

CONCEPT

The concept developed in course of the project is a Christmas calendar smartphone application, aimed for 5-6 year olds in order for them to have another fun way to count down the days before Christmas Eve. The application should provide exploration, curiosity and fantasy in a unique way, with inspiration from the Mamoko book series [10]. The idea is that the children will follow three main characters connected to Christmas, a snowman, a gingerbread man and a reindeer on different missions that will all be connected and converged at Christmas Eve. For each day the characters will perform a new action that will be revealed as the days before Christmas are counting down. This approach was chosen as during the co-design session all children showed that characters were a central focus point of what they remembered from the games that they used to play on their own. Each day also provide an exploration game in which children should find the objects that the characters have their focus on, through click and play. The images that are provided each day will be much bigger than the screen of the phone so that the

children have to drag and explore in order to complete the daily task. The observations of the children from the co-design and evaluation sessions served to determine features for the application.

When opening the application a trail will show with the numbers 1 to 24 in a snowy field with small doors hidden in the snow and current day in December is glowing softly. The users cannot select on days to come, only the current and past days. When tapping on a current day a new window is opened that shows what day it is and a door that shall be different for each day and when entering the exploration image is shown and the game begins. The day is seen as completed when a child have found all the objects that is requested to find as a mini game. After a day is completed an indication of progress, e.g. small star, will be shown on a given day on the trail leading to Christmas. Throughout the calendar, both appropriate music and audio feedback will be provided as Malone and Lepper [9] suggest.

PROTOTYPE

A high-fidelity prototype was developed for the evaluation session with children, see figure 2. The decision to make a prototype that could be tested on a mobile device was motivated by the age of the participants. The co-design session with the user group demonstrated that abstract or indirect representations of mobile technology can be difficult for children to comprehend and relate to. Therefore, there was a need to find a simulation technique that would help to preserve the context and affordances of mobile technology [2]. Also, creating realistic conditions to run an evaluation of the concept was identified as an important feature. With this kind of prototype children could use the same gestures as intended in the application and graphics were developed at a reasonable level.

In particular, feedback on potential mismatches between designed interaction and real life use was desired. For instance, there was an interest to check how users will understand a concept of extended screen space as well as how effective they discover and remember elements which are placed outside the screen.

In regard to the concept, there were several possible aspects to test. For the scope of the evaluation session the focus was on verifying the functionality of a basic module of the application, which is a game designed for one day of Christmas calendar. Therefore, elements of the concept application that were implemented in the prototype included a main menu with representation of the calendar, a screen with the date and the doors leading to the exploration game, and the mini game itself.

As the theme for visual design of the prototype served a popular Christmas time tradition of creating gingerbread houses. The gingerbread motif offered well defined visual style, helped to keep design consistent through different screens and made representations easily recognizable for

children. The characters created for this purpose included a gingerbread man and a snowman. The mini game consisted of a static image showing a winter landscape with a house, in which characters perform different Christmas preparations. The task was to find in the picture three elements shown on the bar placed on top of the screen, which included a star lamp, saffron buns and candy canes. When the player tapped a correct element, feedback was given so it appeared in the top bar and a short congratulating image was displayed. The prototype was realized so the children could test all the application functionality designed for one day of the calendar. Feedback on this game of the day scenario was crucial for the concept development, therefore the focus has been on interaction design and not graphic design of the prototype.



Figure 2. Screenshots from the high-fidelity prototype.

DISCUSSION

The experience of designing for and with children differs very much from our previous projects due to uncertainty on the level of engagement that can be expected from the design partners. Initially, a designer can find it challenging to get children involved and to keep their attention, and in consequence, to ensure that the goals of the design activity can be accomplished. The experience gained during the project showed that design with children participation requires thorough planning and careful execution. Equally important is also to have a flexible mindset and be prepared with backup plans.

Employing an adapted version of the “Mission from Mars” method proved to be a particularly effective narrative in context of the project. Introducing the designers as foreign researchers allowed to justify them as observers during the sessions. Furthermore, this technique facilitated receiving more input from the participants, especially in combination with drawing activities.

The co-design workshop offered the basic input that guided the development of the final concept. The idea for a Christmas calendar emerged due to the fact that the

sessions were conducted in December. The concept related to seasonal events was relevant for the design partners, but highly context dependent. Following this approach, it would provide a different outcome if carried out in another time of the year, but can be similarly based on awaiting an event important for a child. For the co-design session the paper wireframes were used over more advanced prototyping methods. For instance an alternative could be mixed-fidelity technique using ClearPanels [2], but it would have gone beyond the scope of our project, since the aim of the workshop was to tap into children's perception of the smartphone screen, not the smartphone as a device.

The evaluation session provided its own share of useful outcomes. It was observed that the children enjoyed exploring images by dragging and scrolling, as well as they used a limited set of gestures, mostly tapping and scrolling. Also, our participants tended to give more importance to characters rather than objects in the graphical representation. Another observation was that audio feedback was more important for the one girl participating and was not noted by any of the three boys. Although an isolated observation in our case it is interesting thus it supports the findings of Malone and Lepper [9]. The number of participants may seem small, our experience proved that handling more children would increase difficulty, while decreasing the possibility to establish personal contact.

Several ideas for a further development were drawn out of the evaluation session, including refined design of characters and screens, as well as appropriate level of challenge in the mini-games. The implementation of a full scale prototype would be needed in order to evaluate how the play would evolve with time.

CONCLUSION

The outcomes of the two participatory design sessions were channeled towards a design concept themed around Christmas and centered on memorable characters. The main goal of the application is to provide children with an engaging, yet non-addictive pastime activity.

The child-centered methods used during the project were adjusted to the project context and participants. It led to the conclusion that design activities with children need to be carefully arranged according to the requirements of a target group. This gives that child-centered methods require a level of flexibility and adaptation in order to give relevant results.

Another conclusion drawn from the project is that children identify games mostly through the characters, what is worth to consider in mobile application design. Moreover, it was observed that for 5-6 year olds the goal of a game was of secondary importance comparing to the interaction affordance it actually provides.

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