Play It My Way: Participatory Mobile Game Design with Children in Rural Nepal

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Abstract. This paper describes a participatory study with 35 children, aged 9–12, from a rural Nepalese village in the Himalayan Mountains where they were asked to draw a picture or pictures of a game that they would love to have in a digital pen pal app that is being developed. Altogether 58 game designs were collected. Seven of them were new game ideas with some reflecting the children's own culture and community. There were also inevitably some cases where the children appeared to have copied from each other.

This paper gives details on how the study was conducted, it gathers together the full results and then reflects on both the worth of the drawn images for the game design and the usefulness of the drawing-based design method. The paper also analyses and critiques the effectiveness of the participatory design method with children.

Keywords: Participatory design · Child computer interaction · Game design · HCI4D

1 Background and Related Research

With conflict in many parts of the world, helping children to learn about the world, by communicating with other children, is timely. One way of doing that is with the help of pen pal activities. Using pen pals in childhood used to be a common activity during the 1950s and 1960s where children used to make friends from different parts of the world, and learn about different cultures and languages, through letter writing. Shulman explains in his paper how the pen pal activity initiated in school managed to develop a safe, close and open relationship which continued to adolescence [1]. This really helps to bring the world together.

Times are quite different now and the writing of letters to people in other lands is much scarcer. Technology has taken a big leap and people can now talk to anyone they want with the help of it. There are several applications where people can make friends and talk to each other and while some are reported for adults [2], pen pal like systems for children are uncommon and are not seriously researched. In this work we are exploring how such a product, a digital pen pal app (hereinafter referred to as 'Digipal') can be developed and what functionalities it should need. The app is being iteratively developed whilst research is also taking place.

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One difficulty for this kind of application is that the children from different countries often do not have a shared language. One solution to this is to create applications that use English as this is a widely used second language – but this then creates an asymmetric conversation with the power being given to the person with the stronger ability in the English language. In cases where intended communication is between a child with English as a second language and with a child with English as a first language – the latter has the advantage; but also, this model diminishes local languages by relegating them to a secondary position. Our aim, in our work, is to create a method by which children can talk one with the other in their own languages with no preference being given to one language over another.

This Digipal app, which is being built at the moment (see Fig. 1), is supporting research to understand how children from different parts of the world can make friends with other children in different places, each using their first languages. In making friends in this way, the children will learn about each other's different cultures and lifestyles. The app will let the children send letters to other children in their own languages which will be translated with the help of the Google API which is integrated within the app.

Children are also participating in the design process, contributing to requirement gathering and critiquing the product and giving feedback. The inclusion of children in the design process is really important to ensure that the app is attractive and useful for the children who will use it.

Fig. 1. Digital pen pal app

Having children participating in the design process is advantageous as they think differently than adults. Read et al. [3], explained in their paper that participatory methods for children to contribute to design are beneficiary. This type of participatory design with children has increased in recent decades with an interest of taking ideas from the children as the social actors and listening to their experiences rather than treating them as the passive part of the society and as pre adults waiting to be competent. Researchers argue how children can aid understanding and generate data that cannot be achieved by working with or on adults [4, 5]. The premise is that children should decide on what they want in the system rather than the adults making the decisions for them.

When children act as co-researchers they help the principal researcher in the process to find a clear view of the design matters or to see the children's perspective. For example, Honkanen et al. [6], worked with children to research on subjective well-being in residential area. Children (aged 2–13) along with young people (aged 14–16) participated in the study where they were asked to take pictures of the places they spent time in as well as the situations that made them feel good. The children and young people were free to take any pictures they liked. This provided them with freedom for their actions. In this way, children were participating in research rather than being subjects or objects of research as used to be in traditional approaches. The researchers used a socio-cultural approach believing that the time, place and actors each affect the participants' experience and perspective.

For the initial requirement gathering and development purpose for this Digipal app, only children from Nepal and the United Kingdom are being designed for. For this inclusion, an interaction problem is encountered as due to the time difference between these two countries, the communication between the children doesn't happen at the same time. A letter sent today can only be read and replied to on another day. This makes the letter exchanging activity a bit boring because of the waiting.

According to Yarosh et al. [7], communication in different place and time is a complex phenomenon especially when there is a time zone difference. Their research included an experiment where children from different locations were enabled to video conference with one another to engage in social free play. Though the children hesitated and were self-conscious initially, they were later seen to be enjoying, interacting and reacting to each other's activities and being creative during the session. This gives an idea on how children can interact with each other and can have a playful experience even when they are not present in the same place. More research is needed to bridge different place/different time, however. One way to deal with waiting is to include games within the app. Such games will add the fun and the engaging aspect to the app to make the communication much more sustainable. As an example, children could play the game and challenge their partners, or share their scores, until they get their reply thus keeping the children within the environment.

As the app is developed for the children, it is very important and logical to include children to get the ideas for the games too. That is why a participatory design method is used to get ideas for games.

Sim et al. [8], explored how a group of children from England developed a fun game for Ugandan children. In the study, children developed a health-related game intended to elementary school children from Uganda. There was evidence that the designer children

really thought about the target group and that this was a successful process. In another similar research, children participated in a game design session where they were told that the game was being designed for other children but actually, they were designing for themselves. The study showed that the children were able to participate in such activity and really come up with new and cool game ideas [9].

Gathering game design ideas with the help of drawings is encouraged because, according to Salmon and Lucas [10], art-based methods are very suitable for children because children find it hard to express things orally. Drawings are a way to express how the children feel about something, convey their point of view and ascertain their development. Drawings also richly explain how children see the world and they are a familiar task to them and they usually like to do it too [11]. Children naturally start to draw as soon as they can hold a drawing utensil. This is their first representational way to express and communicate with the world which is why drawing is a great way for children to express the views and interpretations of their experiences and also their hopes and fears [12].

For any drawing activity with children, it is important that they draw freely without constraints. On the study by Villarroel et al. [13], children were asked to draw pictures of plants. The children were given instructions before the drawing activity started about what was expected but once the activity started, they were left with full freedom on what they wanted to draw. The authors found remarkable results on how much children can express themselves. Kullman [14], also found, in his photo and video taking study, that if children are left free to do whatever they want, they will try new things, be more creative, and even find new ways of using the materials provided.

Using drawings to capture 'cultural expression' has been a common activity in the research [15]. Barraza [16], gathered 741 drawings from 247 children aged 7–9 where they were asked to draw about the perception, expectation and concerns about the environment. This work showed that more that 37% of the children expressed deep environmental concerns. That shows children are experts in their surroundings and the environment around them. Other researchers described this in their paper that the children seem to know a lot about their surrounding and their culture and they can be taken as the experts in those fields as they were clearly showing that in their drawings [17].

2 Research Design

The question in this paper was '*to what extent, and with what results, could a group of children in Nepal contribute ideas towards an app*?' The novelty was that very few studies have looked at participatory design with children from such communities. Children in Nepal typically have highly structured education and their experiences of working freely on creative activities was expected to be different from those of UK children. A design aim for the paper was '*to also uncover some ways to culturally align any included game with the Nepalese context'*.

Given that the work was also being situated in a rural part of Nepal, another question was '*to understand game preferences of children from rural Nepal*.' This paper describes design work from a big fieldwork study where the children from a small school in a rural village of Nepal carried out a number of activities. The study was conducted by the first author and the other author contributed to the analysis and paper writing.

2.1 Participants

Children were chosen by the head teacher of the school; he chose 35 children within the age group of 9–12. Each child and his/her parents consented to take part in this study. The study was clearly explained to the children before the activity started. The work was covered by ethical approval from the host university and approved by the school board. The children had limited English and the school was situated several hours into the hills surrounding Kathmandu. The researcher had to take a bus and walk several miles to get there.

2.2 Tools

As explained above, the app development process was incremental. At the time of this study, the app was in its second version (shown in Fig. 1). The children used this app, on an Android mobile device, for the first phase of the activity. In the second phase, they used a sketched prototype of a mobile phone (shown in the Fig. 2), and were given a pencil, some colours, an eraser, and a sharpener for the drawing activity.

Fig. 2. Mobile paper prototype

2.3 Procedure

The participating children were taken into a classroom which was set aside for the sole use of the researcher for the study. The participating children did a number of different activities in a full day session. This paper describes two of these activities associated with app design.

Activity 1. In this activity, the children used the second version of app (Fig. 1.) installed in an Android device. Due to the researcher only having a limited number of devices, only five participants took part in this activity at a time. Children were each given a mobile phone with the app running and then they would select their country flag which would take them to the second page where they would write a letter to an imaginary friend in the UK in their own language (Nepalese). They would then give the phone back to the researcher and go back to their seat to continue with next activity.

Activity 2. After everyone had used the app, the children were asked if they liked to play games on the mobile phone and everyone answered "Yes". Then they were asked if they wanted to have a game in the app they were using before, and the answer was again a unanimous "Yes". After that, each child was given the paper mobile prototype and all the drawing tools required as explained above. Then they were asked to draw a picture or pictures of a game that they would like to have in the digital pen pal app. They were encouraged to be creative and to think about a new game. They were also asked not to copy from the person sitting next to them. They were also asked to name their imagined games, describe in words how the games would be played, including how to score points if relevant, and how to win. No time limit was imposed, and no instructions were given. The children drew freely and handed the drawings to the researcher once they finished.

3 Results

All the children were able to draw some games. Altogether 58 game designs were collected from 35 children out of which 7 were new game ideas. That means some of the children gave more than one game design idea. The data shows that 18 of the children drew one game, 14 drew 2 games and 3 drew 4 games. The average number of games drawn by the children came to 1.65. This multiple game design might be because they were drawing freely without any time limit, so many had enough time to draw more than one. The results seen in [14] are similar as the children were drawing freely that encouraged them to be more creative. The results are further explained in following points.

3.1 Games Frequency

The games were examined and coded using thematic coding to bring similar games together. This coding resulted in 20 unique game design themes with 6 of these being drawn by more than one child. These six are shown in Table 1.

Table 1. Frequency of the type of games

Game	Number of children
Driving	19
Snake	14
Car race	4
Bubble Shooter	2
Shooting	2
Break Wall	2

Driving and Snake games were both very popular with 19 and 14 of the drawings being these respectively. Examining the similarities in drawings it did appear that this was sometimes because the children were sitting next to each other. This is one of the disadvantages of group work for research. It is noted that a similar observation was seen in [6]. However, [11], argues that the drawings still represent personal expressions and thoughts so should not be summarily dismissed. Even if they were influenced from another, the drawings looked a bit different anyway with some extra or less details on them. Other researchers add to this aspect mentioning that children's drawings' results are easily influenced by so many factors like what others draw or say in the group [18] (Fig. 3).

3.2 Instructions and Result

Children were specifically asked to name the game, write how to play, and detail how to score. Results gathered are represented in Table 2.

Seven of the designs contained all three of the descriptions in writing; these could be said to be complete. Naming the games appeared to be quite easy for the children – as evidenced by the large number of games (44) that had names. Much fewer children were able to describe how to play (12) and how to score (17). Regardless, only nine (c15%) of the drawings didn't have any detail on them. It could be that was because the children didn't know what to add but alternatively it could also be that these children thought the drawings are self-explanatory.

3.3 Game Designs Inspired by Culture and Daily Lives

Seven of the drawings seemed to be influenced by Nepalese culture. For example: one was a drawing of a card game that is played only in Nepal. Another example included a Nepalese flag on the finish line of a car race. The roads for the vehicles were curvy which is normal for the context of Nepal and one child drew a game that involved fighting a tiger which was possibly a result of the village they lived in being close to the forest where tigers were found. These cultural images confirm research that reports that children include social and cultural elements in their drawings [15] (Fig. 4).

Fig. 3. Most popular driving game picture

Table 2. Number of games with the details

Instruction	Number of game design containing
Name	44
How to play	12
How to score	17
None	9

There were some cases where the children designed a game which seemed quite well related to their daily life or to something they love to do. Examples included games of cricket which is very popular in Nepal, Slingshot Catapult games, Carrom board, Snakes and Ladders board game, Cycling, Card games etc. These are all based on games or activities the children play or do in their daily lives.

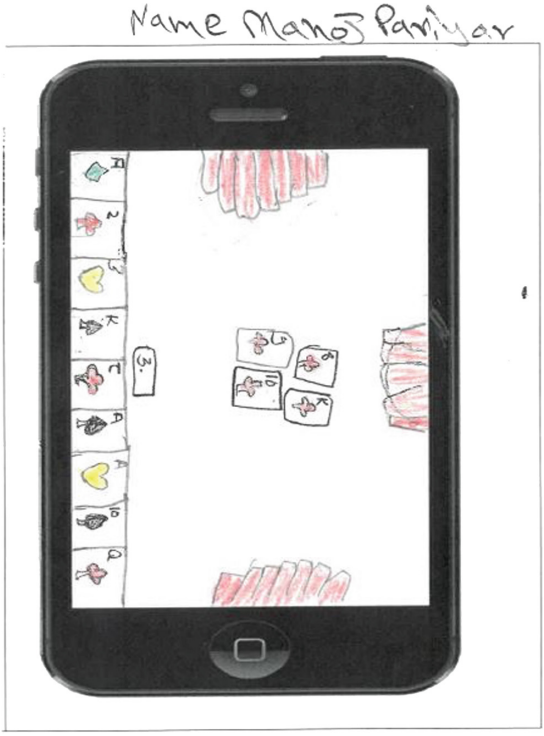

Fig. 4. Card game: played only in Nepal

4 Discussion

Returning to the research question '*to what extent, and with what results, could a group of children in Nepal contribute ideas towards an app*?' it was seen in the findings that children could in fact do this activity and they were able to provide some, if not very imaginative, results.

It was found that the activity did '*uncover some ways to culturally align any included game with the Nepalese context'*, and some of the game preferences of children in Nepal could be said to have been uncovered although the issue of sharing and perhaps copying was possibly a confound to this.

4.1 Process

Children Could Do It. Sometimes participatory methods are criticized by researchers saying that they are largely managed by the researchers not the participants. Researchers are concerned that participatory methods are in danger of being seen as a 'fool-proof' technology, writing: 'we have not been arguing against participatory methods as such- we have no particular issue with researchers asking children to draw, dance or build – we are simply concerned that such methods are not used naively.' Methods used for child participatory design are equally problematic being ethically ambiguous to other research

methods. The researcher influences children due to the power imbalance to participate in certain ways [19]. Others argue that the social pressure and the adult controlled study session has some effect on the responses of the children [11]. In our research we have tried to ensure that children were given the full power on what to draw and what to include in their drawings. After giving the mandatory instructions for the activity, the children were left free until they handed the drawings in. Children were able to express their desires through drawings. They were given the freedom to draw anything they liked, and everyone participated. Most of them were able to give a unique name to their game and some of them were able to explain how to play and how to score the game too. Most importantly the study showed that the drawing method can be used to get design ideas from children.

Game Details. Referring to results, we found out that, despite the instructions clearly asking, only seven drawings had all the 'required' details – viz. game name, how to play and how to score detail. An interesting point is all those seven drawings are from the children who focused on drawing only one game. It is possible that the other children were focusing on drawing more games and forgot about the details but there were eleven children who also only drew one game but still didn't add all the details, so, it really depended on the individual. A similar kind of observation was explained in paper [8], when the researcher asked Ugandan children to draw an educational game design for children from England. The researchers were expecting to get educational stuff, game design and interface design from the children but the children only delivered a subset of these requirements.

While children almost all named their games, many seemed to struggle to explain how to score and how to play. This could be because the games they know have English language interfaces which they found difficult to express in their own language. As an example of an under described game, example, one drawing had floating coins in front of a bus. We can imagine that the bus is collecting the coins which will add to the player's score but that is open to doubt. Some of the game designs had scores on the screen but didn't explain the scoring 'mechanism' like in the game by one child who wrote that in the driving game the score was by having passengers or by collecting coins.

In describing how to play there was also some uncertainty and some obvious things missing. For example, for a snake and ladder board game, the child forgot to write that there had to be a dice. There was also some confusion with some children thinking only about the technical and user interface part of the game and so writing and drawing about the buttons they needed to click to start the game.

Interpretation. Even if the children had the full power on what to draw, at the end the researcher is the one who does the analysis of the data and there were several cases where the researcher had to make a guess as to what was intended. When drawings are interpreted, do the researchers interpret them too little or too much? This is another critical question to consider [11] That is why many researchers have emphasized the importance of listening to children's perspectives [13, 20, 21]. One option is to capture both audio and drawings which is a much more effective way. [22] explained in his paper that creative visual methods do not really give the researcher access to what people really think or feel. Interpretation in this study was improved by having the drawings looked at by a native Nepalese researcher but still we conceded there were some uncertainties.

4.2 Product

Games that are Already Out There. Even though we encouraged the children to come up with new game ideas, most of the children drew games that are already out there. This could in part be considered a consequence of working in groups where it is known children 'borrow' from one another but, as pointed out in [11], the drawings still have to be considered to represent personal expressions and thoughts and cannot be completely ignored just because they are not new game ideas. On top of that, the app is being developed for the children, but we are asking for their ideas and therefore have to consider them. This is the whole point of participatory design.

Cultural Insights. The children included some cultural objects in the game designs for example a Nepalese flag at the finish line of the car race game. We refer to these as *low-cost cultural overlays* – namely things that could easily and cheaply be skinned onto a relatively complex game design in order to give it some cultural positioning. There is a much bigger challenge to design deeper culturally situated games especially when the app is intended to cross cultures. Skinning a UK or Nepalese flag is easy – making a game that is on the one hand Solitaire and the other Carrom, is much more challenging. The Nepalese children are already playing games that have been developed for children from western and developed countries and that was evident in the drawings they made, but the children in the UK were not accessing Nepalese traditions which provides a lop-sided ness to cultural balancing. The challenge is therefore how to enable this deeper cultural meaning in cross cultural design.

5 Conclusion

Children can take part in a game design session and can come up with nice game ideas if they are given the freedom on what to draw. The drawing method helps them to be creative and express freely. Some of the games were culturally influenced by things the children do in their daily lives, and by their surroundings. The responses from the children seem to be affected by the people they live with, and the environment where the study is done. Most of the children were able to name the game they designed some even explained how to play and score. In several cases the drawings were not clear, and no detail was written on how to play. That necessitated some interpretation which was challenging. An interview session with the children after the activity could have improved the results.

Future work aims to replicate the same process with children from United Kingdom which will allow for some cultural comparisons. The ideas described in this paper will be used to improve the sustainability of the Digipal app and bring the participants closer with game play and share experience.

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