

Exploring a new model for online child collaboration for design tasks, inspired by traditional crowdsourcing platforms

Martine A. Bak¹, Javed V. Khan¹, Suleman C. Shahid², Asad Abdullah²

¹Eindhoven University Of Technology, ²Lahore University of Management Sciences
m.a.bak@student.tue.nl, v.j.khan@tue.nl, suleman.shahid@lums.edu.pk, 14030012@lums.edu.pk

ABSTRACT

UPDATED—13 January 2017. Adults all over the world are active on crowdsourcing platforms. In a crowdsourcing platform requesters can outsource a task to an (online) crowd. But why are there officially no children on these kinds of platforms? Is it not wanted by society, can't it be done because of legislation or is it simply not developed for children yet? The main aim of this paper is how we can make crowdsourcing appropriate, suiting and available for children the age group of six till nine years old. This research contains interviews with parents, co-design sessions to test crowdsourcing elements for children, and an evaluation of a prototype platform. The final goal is to set up guidelines to create crowdsourcing platforms for children. Children crowdsourcing platforms should have an educational nature. Crowdsourcing tasks for children can be made suitable by letting them draw their ideas. This is a safe way of communication and a skill all children have and enjoy doing. Finally, we state some general guidelines for the development of children's crowdsourcing platforms.

Author Keywords

Crowdsourcing; Children: Participatory Design, Co-Design

ACM Classification Keywords

H.5.2. User Interfaces: *User-centered design*; H.5.3 Group and Organization Interfaces: *Collaborative computing*

INTRODUCTION

Crowdsourcing is a concept used all over the world by adults. But why is it not available for children? Children tend to have more creative skills than adults and are very open minded. Children would be a great user group to work on crowdsourcing platforms for creative tasks. Also, participating in a crowdsourcing platform could be a great educative experience for them, e.g. teaching them about the Internet, training their creativity or doing educative tasks.

© 2016-2017 Martine Bak, Javed Khan, Suleman C. Shahid, Asad Abdullah

The main aim of this research is to find out how crowdsourcing can be made appropriate, suiting and available for children. This paper mainly focuses on children in the age group of six till nine years old. We want to do this by finding the objectives for parents to have their children on a platform. What do parents find important when their children are online and participate in a crowdsourcing platform? How could a child crowdsourcing task look like? And how do children react on such a task? With all the objectives found we want to make guidelines and design a prototype for a children's crowdsourcing platform. We want to evaluate this platform prototype and see if our guidelines match with the real situation.

This research is conducted in collaboration with the Lahore University of Management Sciences in Pakistan and the Eindhoven University of Technology in the Netherlands. Because of this, the research has been conducted in the Netherlands and Pakistan. This will give global perspective and to see if this children crowdsourcing could be universal for all the children over the world.

BACKGROUND

Children are being involved in design processes for quite some years and researchers want to make use of children's input in designs. However, involving children as participants can be hard [4]. Not only you have the challenges of good communication and understanding of the relationship between adult and child. It is also hard to get to children as a participant because you will need the consent of their parents or guardians. Several techniques for involving children in the design process have been developed over the years. However, most of these techniques are still not used online by the crowd. By adopting these techniques for online crowds, more children can be involved in the design process, and more globalized designs can be made.

There are a few methods of design inquiry that could be adopted into an online version. A technique that could be used and be adapted for online use is comic boarding. In this participatory design technique, comic books are created to have special engaging brainstorm sessions with children [9]. Another specific technique for cooperative inquiry is layered elaboration. With these technique design partners can work on top of each other's work without destroying the layers before, this enables revisiting previous ideas and

has input from several people [14]. This technique has been adapted to create a co-located cooperative design method. This method became a tool that was developed and called DisCo. This tool had the basis of layered elaboration and made into software drawing board [13].

But if child participants for design processes are wanted, why are there not a lot of crowdsourcing platforms for children? This would give quick access to input from children all over the world. There are a few examples of children crowdsourcing initiatives, but these are very limited. Lego has the Platform of Lego Ideas, which is open for children from the age of 13 [10]. Ikea has a reoccurring online design competition for designing stuffed animals for a good cause [5]. And in the Netherlands, there is an initiative for younger kids to make small stories, called “Brikkies”, with illustrations. This platform is called Brikki [1].

We could hypothesize several reasons why children crowdsourcing platforms are not widely available for children this could be because it is simply not wanted by society? Or not made available for children because these platforms are simply not developed? Or is it not allowed because of legislation?

There is legislation about children and working and participating on crowdsourcing platform. “Existing crowdsourcing platforms demand members be at least 18 years of age” [6]. There are a few exceptions like the platform of Lego Ideas. Lego’s terms of service states “To access the Platform, you must be at least 13 years old. If you are between 13 years and 18 years old you can create and submit ideas, however, we will need a parental consent from your parent/legal guardian if the idea goes into production or if we decide to produce your idea.” [11]. Next to this legislation there can be other reasons why children are not on crowdsourcing platforms.

Another reason could be because doing tasks on a platform can be seen as work or exploitation and the reward can be monetary. The United Nations states guidelines for its member nations about work: “The minimum age for work should not be below the age for finishing compulsory schooling, which is generally 15” ... “Children between the ages of 13 and 15 years old may do light work, as long as it does not threaten their health and safety, or hinder their education or vocational orientation and training.” [12]. However, there are a few exceptions. For example, in the Netherlands, it is allowed by law to do acting and modeling jobs for a few hours a year with strict boundaries as of a very young age. In the age group until seven years old they are allowed to work two or four hours a day, six days a year. From seven till thirteen years old the child gets the more they are allowed to do, still with strict boundaries [3].

METHOD

This research on investigating the possibilities of crowdsourcing for children consists out of three main parts.

First, to identify current behavior and opportunities a round of interviews with parents was conducted. Secondly, based on the insights of the interviews, a co-design session with children was held. And as the third part, a prototype based on the previous research was evaluated with children. Together this should give a good impression what crowdsourcing can be for children.

Interviews

The first part of the research consisted of interviewing parents with children in the age group of six till nine years old. In total five families (seven parents, ten children) were interviewed. The primary interviewees were the parents, but the children intervened at times as well, as they were in the room as well. There will be referred to the Participants with the abbreviation P followed by the number of order participation, so participant one will be P1. Three of the interviews were conducted at a code dojo session¹ at Tilburg University. The other two interviews took place at the home of the family. As all the families are from the Netherlands, the interviews were conducted in Dutch. The quotes in the results are translated by the authors.

These interviews were semi-structured and several themes were discussed. The first theme discussed was education, extra curriculum, and work. This theme was discussed to identify the current preoccupations of the children. After this, current online behavior and supervision were discussed to see if children are already online and how independent the children are on- and offline. To look for potential rewards in the platform, current rewards in the household were discussed. To finish the interviews, online collaboration was discussed to identify how willing parents are to let their children come in contact with others- and what the most important factors are for children to collaborate on a crowdsourcing platform.

Co-design

Co-design sessions at primary schools were conducted to see the response of the children on a few points for a potential crowdsourcing platform. This session structure was set up based on the framework of Mazzone, et al. (2011) [8] and with the use of the book Evaluating children's interactive products [7]. One of the sessions took place in the Netherlands with nine children and the other session in Pakistan with 20 children. The co-design session took place in two different cultures to see if it was applicable for all kind of children in different cultures, as an online platform would be available all over the world. The children that participated were all in the age group of six until nine years old. In these sessions, we tested if children were capable of conducting a design task on paper. If the children are capable of completing this design task we can translate this into children crowdsourcing platforms.

¹ Code dojo session, Is a group catering for children were they can learn about programming.

The children in both countries had to do two tasks. The first was to complete a design task. The assignment was titled: "Draw your dream toy here!". We wanted to see how children handle such a drawing task and if the drawings were implementable in crowdsourcing platforms for children. The second task was to work on the look and feel for a platform. The materials the children got for this task was a tablet frame printed on paper. To create their design for the platform they could choose from six designed styles of buttons and elements of a website. These buttons were mostly for navigation for the platform and drawing board designs were provided. With this, they could pick the designs they liked most and themselves create a screen of a platform. The children were also allowed to draw on their designs. This task was created to see what they liked and how we could create a prototype crowdsourcing platform for children.



Fig 1. Setup co-design session in the Netherlands

Evaluation

The design, implementation, and evaluation of a crowdsourcing platform for children followed after this. We build a visual and interactive prototype, the prototype platform was called: Sparkle Crowd. The designs were based on the output of the co-design session. This prototype was evaluated with children in the age group from six till nine years old. They all got presented the app and asked to do (several) drawing assignments and explore the app. During the task, they were asked some questions about the looks of the app, the kind of assignments and the functionality of the app overall and the drawing pad specifically.



Fig 2. Setup Evaluation in Pakistan

The simple 3-tier client-server model is to be implemented for the development of the platform. The clients will

primarily include web browser which will communicate with a web server and database server. Frontend and backend technologies were decided after considering various factors like performance and features availability. The major factor which is playing role in making a decision is CPU & Resource management by the platform and footprint. PHP, having a smaller footprint and light weight add-ons is selected to be the backend language. All the libraries and additional frameworks including Node.js and Angular JS can be used with open source PHP. MySQL database will be used with PHP to store data on the database server. The front-end web languages will be HTML5+CSS3.

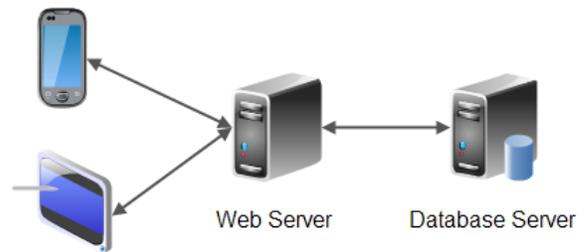


Fig 3. Illustration of the simple 3-tier client-server model

RESULTS

Interviews (in the Netherlands only)

Education, extra curriculum and work

The first section of questions was about the current situation of the children, e.g. to see what kind of education schools offer. Do they already have education how to use the Internet for example and how would this work on an educational crowdsourcing platform fit in this?

Most of the schools only offer extra circular activities if a child falls behind or works above average. Like getting the remedial teaching of extra challenges in the plus class.

- *"They do have extra to offer for extra intelligent children, plus classes. For the children that stay behind, they have tutoring and extra programs. But this applies not to our children. They are just above average"- P7*

All children are enrolled in an extra activity next to the school. The typical things they are enrolled in are sports or something artistic.

Most of the children did have access to educational games on the computer, and played them, but not all that frequently. Parents mentioned they don't want to pay for this software and look for a free alternative. And often schools provided them with the software they also used in class.

Two of the children both nine years old did do "work" within the boundaries of the law. One child did a modeling

job once for a clothing shop. The other child once had a small acting job in a television series.

Overhead

The questions about overhead were focused on seeing how independent the children are and to see if children could work on a platform alone. How comfortable are the parents with this?

There is a big difference in the independence of a child of six and one of nine. Most older siblings may stay at home alone for a little while. The youngest around six were never left alone. And if they were allowed to stay at home the parent was not far away. Some siblings are trusted to stay at home together. In some situations, this would get out of hand.

Current online behavior Child

Questions about current online behavior were to find out if children are online; if yes, what kinds of activities are they doing and for how much time during a week?

The most common activities children do on the computer, tablet or smartphone are watching videos on YouTube, play Minecraft, or play Star Wars games.

All the parents had rules about being online for their children. There was no supervision with software tools. Most of the parents are nearby their child if they are online and keep an eye on their behavior. Some do check the browsing history of the child

- *“My son is very active on YouTube watching videos. I don’t sit next to him, but he is on the account of my husband and we check the history of the account.” – P3*

Also, most of the children were not allowed to play games online connecting with other people.

- *“He is not online with other people because I don’t approve that. Because I have no idea who is behind that. I will leave him in its own safe world. If they play it together with a friend, then I don’t mind. If they connect to each other.” – P4*

Most of the children were not allowed to go on Facebook or do chats. One of the parents did Facebook together with the child to teach them about social media.

Some parents think it is very important to get the child educated about being online. However, often they don’t exactly know how to do this. This is new for them as well. Schools don’t act upon this that much. Some parents do think that this should be taught at school as well.

Most children are online on a daily basis. Approximately half an hour a day according to these interviews. However, in some cases, children can sometimes stay active on the computer a bit longer, like in the weekends.

- *“Normally half an hour per day. And Saturday and Sunday are exceptions”. – P6*

- *“They may play games or spend time on the internet from half 5 until 5. So, about half an hour per day and sometimes it is a bit longer” – P2*
- *“They have their own phone. So, certainly for half an hour a day. And sometimes also an extra hour on the tablet” – P4*

Parents knew some educational platforms. However, if the school does not provide them for free the children will not work on them. Parents do think they are too expensive. They look for free educational (online) tools. Tools they used are Bloon² a free tool or Ssula³ if this was provided by school.

Rewards

We asked questions to parents how they reward their children, to see if we can use these tools also in a crowdsourcing platform as rewards and to what extent they are rewarded.

Rewards are often small gestures in families. Parents give their children a little snack for example or some extra playtime. Some parents give small gifts for extra good behavior.

Most of the children get more negative reinforcement instead of rewards all the time.

- *“We don’t reward really. We do it if he does the dishes really fast, then he will get a cookie and there is time for a game” – P1*
- *“They get minutes on the tablet” – P6*
- *“With cookies and candy. Actually, they are allowed to do everything. I first ask myself why they can’t. So, actually we don’t reward that much” – P4*

Online Collaboration

We asked the parents how they did feel about the online collaboration of their children and if they are open to meet other cultures online.

Not all parents are open to new cultures. However, others want to stimulate to meet new cultures. So, this depended on the family.

Most children are very creative and probably are able to create drawings for an assignment. Parents compared this with Minecraft.

- *“Minecraft is also a lot of building. So, it could be more or less the same” – P1*

² www.bloon-methode.nl/, a free online method to practice spelling

³ www.ssula.nl, a subscription based platform to practice all subjects in primary school.

Co-design

Introduction

In the introduction, we asked the class a few questions about the Internet. They got the concept of what the Internet is and what a web page/app is. Almost all of them could explain what the Internet was and how they used certain apps.

Drawing

In the Netherlands, a group of nine children between the age of seven and eight years old participated in the co-design session. Seven out of nine had an idea right away. Two boys were a bit slower and did not have inspiration right away. The lead researcher helped them a bit in a direction like a parent or a teacher could do. In the end, they all produced at least one drawing in about 25 minutes. One child stood out and made a series of three drawings. In total, the group of children produced 11 product idea drawings.

Also in Pakistan, the assignment was received nicely. In this session, 20 children participated. Children were quite excited and talked to their peers to come up with some different sort of toys they were more prone to make a new toy by combining two existing toys. These children drew also a lot of robots. Furthermore, a lot of ideas had to do with badminton. One of the children started with an idea with a badminton game and the children around this used this as inspiration. This resulted in a lot of drawings with badminton as the main inspiration.



Fig 3. A drawing of a child in the Netherlands. Titled: getting well hug robot (caring robot)



Fig 4. Drawing of a child in Pakistan. Titled: Remote control ship, remote control car, bat ball, computer helicopter.

It depends on the child how creative they are and how confident they are to put this on paper. However, all the children were capable of drawing a dream toy. The children all drew different things. There were a few recurring themes; these were robots and stuffed animals. Boys drew more of the robots, but also villains, heroes, and cars. And girls more of the stuffed animals with a touch robot and games. Between the drawings in Pakistan and the Netherlands, it showed that the children in the Netherlands drew a bit more expressive and these drawings had more intense coloring. The drawings from the children in Pakistan were a bit more minimalistic with less use coloring of the drawn objects. Also, the children in Pakistan were more focused on creating new toys by combining two existing toys. As the children in the Netherlands gave more existing toys their own new creative touch.

Web designing

All of the children designed at least one tablet page. For both the children in Pakistan and the Netherlands this was a somewhat harder task for them. Most of them did not think about a concept for the page. They just looked at the materials and picked what they liked. The girls put more emphasis on the colors and the looks. Boys had more of a technical idea behind it, they focused more on buttons and explained how this would work. Girls in the contrary made something they thought was pretty. In the end, the children liked the materials of the buttons and drawing boards that were provided. All different styles were used.

Children designed more the look and feel than a concept. All the kind of styles of materials were used. There was not one kind of style that really stood out. The children mixed all kind of styles on one tablet screen paper. The most used element was the logo of Sparkle Crowd. Also, the children used their own imagination and drew on the tablet screen.

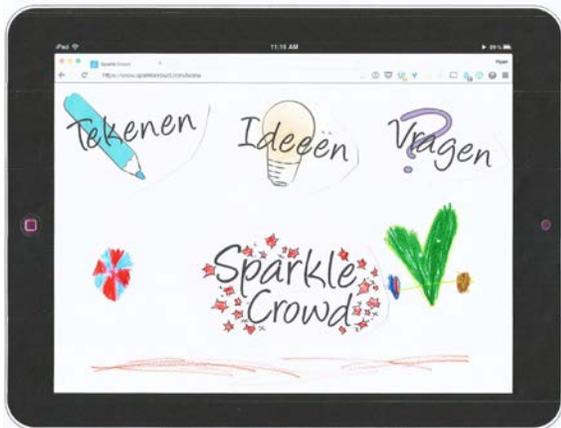


Fig 5. A tablet screen designed by a child in the Netherlands with extra drawings on top.



Fig 6. A tablet screen designed by a child in Pakistan.

Evaluation

When evaluating initial ideas about children's crowdsourcing, the children were confronted with the prototype of Sparkle Crowd. In the Netherlands, we tested with four children in a home setting with children from six till nine years old. And in Pakistan, we tested 12 children in a primary school in the age of five and six years old.

All the children were enthusiastic about the app and wanted to start drawing right way. They did not extensively explore the app for all the functionalities; they were really drawn to the drawing assignment.

Most of the children had to figure out how the drawing tool worked. However, after a few minutes, they figured it out and continued drawing and trying all the tools available.

There was a difference to be seen between the age of six and nine. The younger children were not that focused on the drawing assignment but, just enjoyed themselves drawing on the pad and using their fantasy. The older children were very capable of drawing precise ideas and had more detail in their work, with a more detailed idea behind it.



Fig 7 and 8. Drawings by children in Pakistan age five - six years old

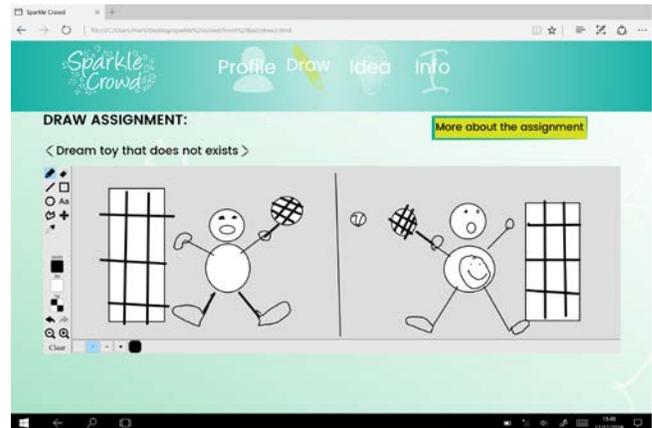


Fig 9. Drawing by a child in the Netherlands age of nine years old

During the drawing, we asked them a few questions about the impression of the app. Overall they liked the looks of the app. Some children were more focused on working on a specific theme, while others prefer it if they could do free drawing.

DISCUSSION

Overall, we can make crowdsourcing available for children in a safe way. Parents were quite specific about the platform needs to be safe. Parents mentioned that the children were not allowed to post YouTube videos of themselves and the children were not allowed on social media or any other chat related activities. To overcome this treat we tried how communication by drawings works and if the parents can see this as safe.

Drawing and the drawing pad have some limitations because the children can't explain anything more behind the idea. However, results in this platform could be better used as inspiration and not a readymade product idea. Also, having a drawing pad gives some limitations as well, because the children had some trouble using the drawing tool at first. However, this probably would not be a problem because children go through the similar process drawing on

electronic or traditional media. They have to explore the medium in order to work with it [2].

Other elements of the crowdsourcing platform were not explored extensively. For example, rewards on the platform should be in the sense small gestures that keep them motivated and willing to participate in the platform. Is the educational expect enough for children to be encouraged and continue to work on the platform? Also, the further out collaboration through the platform can be examined more. For safety reasons in the prototype of Sparkle Crowd, the children can only see others' work, but they cannot yet react to each other's work. More explorations with layered elaboration can be added to the platform.

Overall for a child platform, there are age differences. In this paper, we focus on children in the age group of six till nine years old. Already in this age group, we saw great differences. We saw differences in the capabilities on the drawing itself, but also in the detail level of the ideas. Therefore the age of the child should be known in the platform. If it was possible to filter the results of the drawings by for example of age or gender it could be valuable for user research and co-design.

What also could be valuable for user research and code design was that during evaluation the children draw sometimes more or less within the same theme. If your tasks have a lot of the same responses this could say that there is a general interest for that kind or answer to that task.

CONCLUSION

This paper discussed how to make crowdsourcing appropriate, suiting and available for children. We conducted interviews with parents to identify the objectives of the parents for getting children involved in an online collaboration platform. After this, we examined several elements of a crowdsourcing platform to make them suiting for children. And after this, we build a prototype with the input of the research. And this prototype was evaluated if the children would be able to work with it.

To make it appropriate and suiting for children the focus should be a learning experience. This would also not interfere with legislation. If these platforms contain learning experiences and not real working tasks, the children will be rewarded with education and train more of their creativity. Safety within the platform can be granted working with communication trough drawing and with tasks that are provided by adults and being reviewed by a team of critical adults.

A crowdsource task for children explored in this paper is drawing assignments. This was mainly chosen after the interviews with the parents because of the main safety reasons and also the remarks of parents that not all young children are capable of typing yet. The assignments given are still in plain text and with examples of other children drawings. A good feature to add would be audio

assignments that guide the children in the assignment better.

We can formulate guidelines for a child crowdsource platform based on the findings of this paper.

- Create a safe environment for the children to participate on, and that the parents trust.
- Tasks should have an educational nature.
- Children should receive small rewards. This could be in the form of a motivational quote, but not monetary.
- Tasks should be fitting to what the child is capable of. Task categories that could be thought of are drawing children products, illustrate books [9] or design children products logos.
- Parents need to be included in the account of the child.
- Special terms of service focused on the ownership of the results.

ACKNOWLEDGEMENTS

I want to thank my coach, Javed Khan, for great mentoring and delivering me so much feedback.

I also want to thank Suleman Shahid as an expert from Pakistan to guide us in this research.

Next to this Asad Abdullah as my peer for the corporation and the executing of the research in Pakistan.

Finally, I want to thank the Design for Creatives squad, for the great feedback and working atmosphere this semester. Especially I want to thank Koen Damen from the squad for providing feedback for this paper.

REFERENCES

1. Brikki. (2016). Retrieved from <http://www.brikki.com/>
2. Couse, L. J., & Chen, D. W. (2010). A tablet computer for young children? Exploring its viability for early childhood education. *Journal of Research on Technology in Education*, 43(1), 75-96.
3. De Rijksoverheid. (2016). Mogen kinderen tot 13 jaar meewerken aan uitvoeringen? Retrieved from <https://www.rijksoverheid.nl/onderwerpen/jongeren-en-werk/vraag-en-antwoord/mogen-kinderen-tot-13-jaar-meewerken-aan-uitvoeringen>
4. Druin, A. (2002). The role of children in the design of new technology. *Behaviour and information technology*, 21(1), 1-25.
5. Inter IKEA Systems B.V. (2016). IKEA FAMILY | Soft Toy Drawing Competition | Kids Designing for Kids. Retrieved from <https://info.ikea-usa.com/softtoy>

6. Manojlovic, S., Gavrilovic, K., de Wit, J., Khan, V. J., & Markopoulos, P. (2016, May). Exploring the Potential of Children in Crowdsourcing. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 1250-1256). ACM.
7. Markopoulos, P., Read, J. C., MacFarlane, S., & Hoysniemi, J. (2008). *Evaluating children's interactive products: principles and practices for interaction designers*. Morgan Kaufmann.
8. Mazzone, E., Read, J. C., & Beale, R. (2011, September). Towards a framework of co-design sessions with children. In *IFIP Conference on Human-Computer Interaction* (pp. 632-635). Springer Berlin Heidelberg.
9. Moraveji, N., Li, J., Ding, J., O'Kelley, P., & Woolf, S. (2007, April). Comicboarding: using comics as proxies for participatory design with children. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 1371-1374). ACM.
10. The LEGO Group. (2016). Lego Ideas – Home Page . Retrieved from <https://ideas.lego.com/>
11. The LEGO Group. (2016). Terms of Service Version 1.3. Retrieved from <https://ideas.lego.com/terms>
12. United Nations. (2016). Child Labour. Retrieved from <http://www.un.org/en/events/childlabourday/background.shtml>
13. Walsh, G., Druin, A., Guha, M. L., Bonsignore, E., Foss, E., Yip, J. C., ... & Joshi, A. (2012, June). DisCo: a co-design online tool for asynchronous distributed child and adult design partners. In *Proceedings of the 11th International Conference on Interaction Design and Children* (pp. 11-19). ACM.
14. Walsh, G., Druin, A., Guha, M. L., Foss, E., Golub, E., Hatley, L., ... & Franckel, S. (2010, April). Layered elaboration: a new technique for co-design with children. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1237-1240). ACM.

