



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Supporting Social Innovation in Children: Developing a Game to Promote Health Eating

Citation for published version:

Ptakauskaite, N, Chueng-Nainby, P & Pain, H 2016, Supporting Social Innovation in Children: Developing a Game to Promote Health Eating. in *Proceedings of the The 15th International Conference on Interaction Design and Children*. IDC '16, ACM, New York, NY, USA, pp. 688-693, 15th International Conference on Interaction Design and Children, Manchester, United Kingdom, 21/06/16.
<https://doi.org/10.1145/2930674.2935980>

Digital Object Identifier (DOI):

[10.1145/2930674.2935980](https://doi.org/10.1145/2930674.2935980)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Proceedings of the The 15th International Conference on Interaction Design and Children

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/305726895>

Supporting Social Innovation in Children: Developing a Game to Promote Health Eating

Conference Paper · January 2016

DOI: 10.1145/2930674.2935980

CITATIONS

0

READS

12

3 authors, including:



[Priscilla Chueng-Nainby](#)

The University of Edinburgh

18 PUBLICATIONS 42 CITATIONS

SEE PROFILE



[Helen Pain](#)

The University of Edinburgh

114 PUBLICATIONS 1,590 CITATIONS

SEE PROFILE

Supporting Social Innovation in Children: Developing a Game to Promote Health Eating

Nora Ptakauskaite

University of Edinburgh
Informatics Forum, Crichton St
Edinburgh EH8 9AB, UK
s1111477@sms.ed.ac.uk

Helen Pain

University of Edinburgh
Informatics Forum, Crichton St
Edinburgh EH8 9AB, UK
helen.pain@ed.ac.uk

Priscilla Chueng-Nainby

University of Edinburgh
Informatics Forum, Crichton St
Edinburgh EH8 9AB, UK
p.chuengnainby@ed.ac.uk

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author. Copyright is held by the owner/author(s).
IDC '16, June 21-24, 2016, Manchester, United Kingdom
ACM 978-1-4503-4313-8/16/06.
<http://dx.doi.org/10.1145/2930674.2935980>

Abstract

Two things often observed in children: (1) many do not eat a healthy diet and (2) they like playing video-games. Game-based learning has proven to be an effective method for attitude change, and thus has the potential to influence children's eating habits. This study looks at how, through a series of workshop activities, children themselves can inform the design of such games. Using a co-constructive approach, the study's format promotes creativity and control, enabling children to act as valuable informants for its design. Patterns emerging from the study show that children do indeed understand the concept of healthy eating. Future phases of this work will explore whether they understand how various foods affect their bodies. This information will then inform the design of a video-game that encourages healthy eating.

Author Keywords

Co-Design; Social Innovation; Children Games; Healthy Eating

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

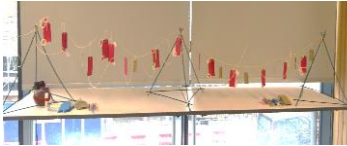


Figure 1. The installation used during the workshop activity (top) and children interacting with the installation (bottom).

Introduction

The rising number of obese children worldwide, combined with an increasing prevalence of type 2 Diabetes, underscores the presence of a public health issue related to children's poor eating habits [1]. Numerous policies have been put forward to promote healthy eating in children. Unfortunately, only a few such standard interventions have been effective [2].

Game-based technology has been shown to be a successful tool for teaching children, and has also been shown to impact their attitudes [3]. Children are more motivated to spend time interacting with serious video-games (designed for learning) than with standard learning tools due to the games' entertaining and engaging properties. They allow users to interact with learning materials through exploring virtual environments and engaging with in-game characters and the games' narratives [4]. Some of these games empower children by enabling them to make their own choices in a safe and controlled environment. The children can see how the decisions they make in the game influence their outcomes, in turn giving them a sense of control over their own learning [5].

The particular focus of this research is on designing Healthy-Eating Games for Children that support the National Health Service's (NHS) change4life initiative (see <http://www.nhs.uk/change4life>). It is currently an exploratory study that forms the foundation for the design of an educational game that will help children better understand what healthy eating is and its impact on them. This paper describes the design approach used in the research and how it relates to workshop activities. A brief summary of the results and their analysis are also given.

Design Approach

In the first phase of this research, co-construction activities were implemented through which the following questions were addressed:

1. What are children's ideas in relation to healthy eating?
2. If they were to design a game to encourage healthy eating, what form might that game take?

These questions were addressed through a workshop involving co-construction by children aged between 7 and 12 years. The children were given the opportunity to participate in social innovation by actively contributing to the design of the game. Of the many different roles they could have been assigned (i.e., design informants, full-design partners, testers, etc.), in this study their task was to inform the design, contributing their own perspectives on the questions in focus [6, 7].

In this workshop, instead of using conventional social research methods such as interview or questionnaire, we adopt visualisation tools from the Collective Imagery Framework [6, 7] to engage the children in telling their stories, thereby informing more specific design goals. In this framework the researchers act as facilitators of the design process, encouraging contributions from child participants whilst enabling creativity. Working with their peers, the children interacted with Collective Imagery Weave (see Figure 1) to tell their stories (in keywords, drawings or verbal narration) to express their opinions about healthy eating. These were then analyzed to identify ideas for game development.



Workshop Activity

The goal of the workshop activities was to gain insight into children's attitudes towards healthy eating and video-games.

Selection and Participation of Children

The participants were 10 children (7 males, 3 females) aged between 7 and 12. They were recruited through a database of families willing to participate in such studies. All were white Caucasian, from higher SES backgrounds. University ethical approval was obtained.

Materials

A physical installation termed Collective Imagery Weaves was used to gather the data (see Figure 1) [6, 7]. A series of questions was presented on paper tags that were tied on to a physical installation made of bamboo sticks and rattan loops. Unlike standard questionnaires and interviews, this interactive method presents questions in short sentences, and in a child friendly manner. The content is drawn or written by hand (see Figure 2 for example questions). This allows for the questions to be visually deconstructed into a smaller number of queries, facilitating short narratives. These in turn make it easier for young responders to address the questions directly from their own experiences, as well as to relate their experiences to them.

Furthermore, by presenting the questions as tags on the installation, rather than being asked directly by the facilitator, there is decreased likelihood of response bias, that is, of children responding with what they believe the facilitator wants to hear [8].

Four sub-groups of questions were used to prime children in their thinking about healthy eating, and to help orient them to designing games to support this. The questions related to their favourite foods, what they perceived healthy eating to be, attitudes towards video-games and designing a game for healthy eating.

Additionally, there was a set of questions asking children about their favourite sweets and benefits or dangers of playing video-games. The tags with questions on eating habits also included pictures of both healthy and unhealthy foods (see Figure 2), acting as reminders of what children tend to eat, which might not always be healthy. These questions and the drawings should further guard against socially desirable responding.

Procedure

The participants were instructed to choose and answer as many questions as they liked. They were asked to start from the left side of the structure (the beginning) since the questions presented at the start acted as primes for the more conceptually difficult ones, which were presented later. If the child could not read, the questions were read aloud by the facilitator. Again, the goal here was to get the children to think about healthy eating.

After choosing a question, the children took a blank tag and wrote down or drew (to avoid any issues with literacy levels) their answers, together with the question number and their names or initials. Alternatively, if children could not express their ideas in writing or drawing at all, the facilitator could write the answers for them. The child was instructed to attach

Favourite foods:

1. What is your favourite food?
2. What is your favourite fruit?
3. What is your favourite vegetable?
4. What is your favourite sweet?

Attitudes towards video games:

1. Do you like playing videogames?
2. What do you use to play videogames: phone, tablet, computer?
3. Name some videogames that you like to play?

Figure 2. Examples of questions presented to the children.

their tag to the weave next to the tag containing the question after they completed their answer.

To promote collective and collaborative creativity, the children were free to talk and discuss their answers with other participants and the facilitators. The children's interactions with the installation and each other were video recorded for later analysis.

Results

The prime data source was the answers written or drawn on the tags (see Figure 3). These were supplemented by the transcribed comments from the video recordings. The actions of the children and their interactions with the installation were not analysed for the purposes of this study. The responses in relation to the questions posed were collated across children, as summarised below.

At the beginning of the workshop the children answered questions related to their attitudes towards food in general, and healthy eating in particular. For example, in response to 'What is healthy eating?', two of the children replied:

- "A balanced diet overall"
- "Healthy eating is when you eat a minimum of fat, sugar, etc..."

Additionally, responses to the question 'What is junk food' were:

- "KFC, Burger King, McDonald's"
- "Everything with a high content of fat"

When asked what they would pick if they had to choose between sweets and fruit, all of the children indicated they would select fruit.

When asked if they were trying to eat healthily, the answers were more mixed:

- "Yes"
- "I try to eat healthily every day"
- "Only if I like it"

One of the children drew scales to indicate that she tried to balance healthy food with unhealthy food (i.e., eat enough vegetables as well as some sweets). Notably, an answer given to the question 'Is meat good for you?' by a vegetarian child was:

"Not too good"

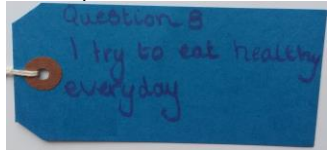
Another set of questions focused on the children's attitudes towards video-games. When asked if they played or liked playing video-games the answer was unanimously "Yes", where all of the children had the experience of playing Minecraft.

They were using computers, tablets, and smartphones for playing video-games, where some of the older children were also using game consoles. One of the children's answer to the question of 'What do you like/dislike the most about video-games' was:

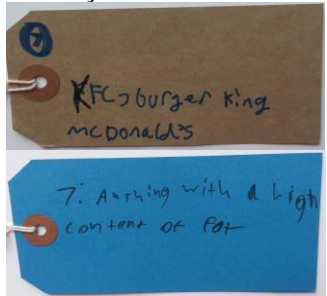
- Like: "Pause reality"
- Dislike: "Addictive"

Interestingly, for the question 'Do you like playing video-games with others?' her answer was:

How often do you try to eat healthily?



What is junk food?



What is your favourite fruit?



Figure 3. Example answers given by the children.

“Okay, if others know the game”

Finally, when asked to choose between different interfaces for a game on healthy eating, the children said that it would have to be either similar to Minecraft or to another RPG or flash mini-game. One of the children suggested using Minecraft or a similar game in which the players could grow and cook food, and the information on healthy eating could be incorporated into the game’s narrative. Another child suggested that the effects of different types of food could be communicated through influencing the in-game character’s abilities based on what they eat.

Discussion

The children in this study displayed a general understanding of what healthy eating is and indicated that they try to eat healthily most of the time. Some of them have even displayed knowledge involving nutritional information, such as that a healthy diet should be nutritionally balanced and include fewer foods that are high in sugar and fats. In this study, the children here were not asked questions directly about how unhealthy foods might affect their bodies.

In order to provide all children with the opportunity to contribute, they were encouraged to draw their answers, as some of them did not have the required level of literacy. The ability to draw their answers promoted inclusion and confidence, which in turn made it easier for them to relate the questions to their own experiences and express themselves.

It was observed that the Collective Imagery Weaves Framework used in this study promoted interaction and collaboration between children. It gave them the means

to connect through participation in the same activity. The children exchanged and discussed their answers vocally, and in writing, as well as in drawing (they could see each other’s tags on the weaves). They appeared to find it easy to understand how to engage with the installation, which added to the creative and rather informal atmosphere of the workshop. The approach served to facilitate their contribution to the design process, and to support their creativity. The installation has therefore enhanced the children’s interactive experiences and by doing so, enriched the study’s results.

The answers and comments given by the children can also be used to inform the design of a healthy eating video-game. For example, one of the children suggested that the game could use a system where the character’s performance in the game would be influenced by the types of foods it consumed. One of the ways this advice could be used is by showing children how sugar consumption can result in hyperactivity and difficulty in paying attention [10].

Additionally, one of the children indicated that it can sometimes be frustrating when the other person does not know how to play the game. Therefore, the game’s interface will need to be simple and intuitive, especially if it will include a multiplayer option.

Finally, a key issue to consider when investigating children’s eating habits is to find out whether they are vegan or vegetarian. Dietary biases such as these could influence responses. Not all of the children will view meat or other animal-related products in the same way, for example. Equally importantly, it is necessary to include participants from all SES groups, since

children from lower SES backgrounds are more likely to have less access to information relating to healthy eating, as well as having poorer diets [11].

Interim Conclusion

Overall, children in this study exhibited a general understanding of what healthy eating is. They knew that they should eat a balanced diet in order to stay healthy. Some of them even knew the nutritional aspects of healthy foods. The next question to be considered is whether children understand the impact and consequences of unhealthy eating habits.

As such, future research relating to this study will explore what children believe the consequences of eating different types of food to be. This information will then be used to design a video-game for children about healthy eating, and how different types of food (i.e., sugar) affect their bodies. A longer term research question is whether this translates into action in daily eating, and what features can be incorporated into games to influence this.

References

1. [Stommel, Manfred, and Charlotte A. Schoenborn. 2010. Variations in BMI and prevalence of health risks in diverse racial and ethnic populations. *Obesity* 18, 9: 1821-1826.](#)
2. [Summerbell, Carolyn D., Elizabeth Waters, L. D. Edmunds, Sarah Kelly, Tamara Brown, and Karen J. Campbell. 2005. Interventions for preventing obesity in children. *Cochrane Database System Review* 3, 3.](#)
3. [Baranowski, Tom, Janice Baranowski, Debbe Thompson, Richard Buday, Russ Jago, Melissa Juliano Griffith, Noemi Islam, Nga Nguyen, and Kathleen B. Watson. 2011. Video game play, child diet, and physical activity behavior change: A randomized clinical trial. *American journal of preventive medicine* 40, 1: 33-38.](#)
4. [Rowe, Jonathan P., Shores, Lucy R., Mott, Bradford W., and Lester, James C. 2011. Integrating learning, problem solving, and engagement in narrative-centered learning environments. *International Journal of Artificial Intelligence in Education*, 21, 1-2: 115-133.](#)
5. [Chiasson, Sonia, and Carl Gutwin. 2005. Design principles for children's technology. *Interfaces* 7, 28.](#)
6. [Chueng-Nainby, Priscilla, and Miaosen Gong. 2013. Collective Imagery: A Framework for Co-Design. In *Proceedings of the IASDR 2013 Conference*.](#)
7. [Chueng-Nainby, Priscilla., Xue, Lin. and Jun, Hu. 2015. "Kindness" as Collective Wishes to Co-Design with Communities for Social Innovation. In *Proceedings of EKSIG 2015*.](#)
8. [Fails, Jerry Alan, Mona Leigh Guha, and Allison Druin. 2012. Methods and techniques for involving children in the design of new technology for children. *Human-Computer Interaction* 6, 2: 85-166.](#)
9. [Bowling, Ann. 2005. Mode of questionnaire administration can have serious effects on data quality. *Journal of public health* 27, 3: 281-291.](#)
10. [Battram, Danielle S., Leonard Piché, Charlene Beynon, Joanne Kurtz, and Meizi He. 2016. Sugar-Sweetened Beverages: Children's Perceptions, Factors of Influence, and Suggestions for Reducing Intake. *Journal of nutrition education and behavior* 48, 1: 27-34.](#)
11. [Goisis, Alice, Amanda Sacker, and Yvonne Kelly. 2015. Why are poorer children at higher risk of obesity and overweight? A UK cohort study. *The European Journal of Public Health*, ckv219.](#)