
Children's Drawing and Telling of Sustainability in the Home

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Abstract

This paper describes a pilot study about children's perspective on environmental sustainability in the home through the drawing-telling technique. We utilize the drawing-telling technique as described by Susan Wright [6] for interviewing children about issues related to sustainability. The participants (children from age 10 to 13) were asked to draw two houses (current and ideal) and then describe their drawings in terms of sustainable actions and features. This pilot study is an initial step to investigate if there are opportunities to develop eco-visualizations (EVs) with children in mind and shows that the drawing-telling technique is useful in researching sustainability and children.

Keywords

Drawing and telling method, eco-visualization, children, home, sustainability.

ACM Classification Keywords

H.5.m [Information interfaces and presentation]:
Miscellaneous.

General Terms

Design.

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Figure 1. *Eco-Eye* is an example of a practical EV. It displays how much money your current energy consumption is costing. ©Peter Longley

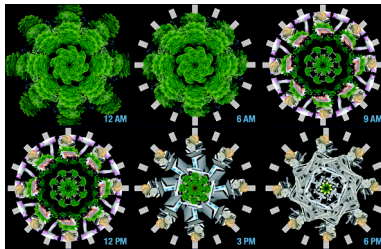


Figure 2. *7000 Oaks and Counting* (by Tiffany Holmes) is an EV that uses artistic and ambient displays to bring attention to the energy consumption. ©Tiffany Holmes

Introduction

This paper focuses on one approach to motivate sustainable behavior by providing real-time feedback on energy and water consumption – specifically in the form of *eco-visualizations* (EV). EVs “are any kind of interactive device targeted at revealing energy use in order to promote sustainable behaviors or foster positive attitudes towards sustainable practices.” [5] (figures 1 and 2 for examples). Most literature about EVs aims at informing future design efforts based on the current state of adult behaviors, attitudes and perspectives on sustainability, there is no literature that investigates the perspectives of children in relation to EVs.

This paper discusses the findings from a pilot study conducted with 7 child participants and how they understand and represent sustainability in their homes. Our aim is to build on this study with a second study with more participants that will contribute to developing a framework for the future design of EVs with children in mind. We used the drawing-telling technique to interview children [6]. Our research questions are: What are the opportunities for designing eco-visualization for children? What representations do children have about their houses and sustainability? How can this inform the design of future EVs?

EVs and children

The field of EVs is still nascent and current research contains scant literature on how children interact with EVs, or about how EVs are designed specifically for children. On the other hand, some researchers are starting to look at how EVs can be better adapted to the user. He, Greenberg, and Huang in [1] argue that most of the current eco-visualization technologies are

based on a one-size-fits-all framework. We argue that when designing EVs, designers should consider children’s motivations, needs, goals, abilities and knowledge and that they may differ from and augment our understanding of adult users and EVs.

Drawing-telling technique

Susan Wright [6] combined the visual channel (what can be looked at) with the verbal channel (what is said) in the technique she calls: drawing-telling. In this technique, the researcher asks children to draw something in relation to a specific subject and then asks them to explain what their drawing means to them. This method is usually used to keep a focus on the lived experiences and on the perspectives of children. For example, it was used by MacDonald [4] to investigate how children experience their first day at school. Stafstrom in [2, p. 65] used the same technique to investigate headaches experienced by children. For this study, we believed that the drawing-telling technique could be appropriate to investigate children’s perspective about sustainability in the sense that this concept requires a certain level of knowledge and vocabulary. Furthermore, since the object of the study was to see if eco-visualization tools could be designed specifically for children, it was insightful to investigate how children visualize and represent their homes and imaginary spaces in a drawing.

Participants and Method

The 7 children (3 girls and 4 boys) from age 10 to 13 were all born in Canada and currently live in the Greater Vancouver Regional District. The children had various cultural backgrounds and attended different schools. The study was conducted in two different phases with two groups of children (3 girls and 4 boys).

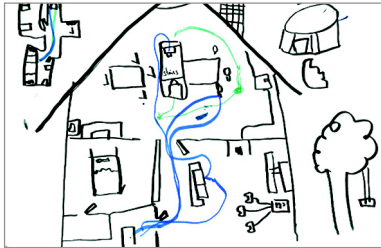


Figure 3. Use of front view and floor plan and secondary floor plans.

For each group, the activity lasted for about one hour. The children were given time to complete the drawings and to answer orally the questions asked. All the answers to the questions were audio-recorded and transcribed.

In the first phase, the participants were asked to: (i) *Draw a floor plan of your house.* This first question was asked as a warm up question, before mentioning anything about sustainability in order to set the mood and introduce the children to the activity. After completing the first task, the children were asked to do the following: (ii) *Using your floor plan, explain your morning or afternoon routine. Draw the path you follow during this routine.* The floor plan helped them keep a mental representation of their house, and made it easier for them to remember the actions. The goal of this question was to prepare for the following question about sustainability. It also allowed for possible spontaneous answers about sustainability actions. Following this, they were asked: (iii) *Do you know what sustainability means? Can you explain what it is?* If they could not answer, they were asked: (iv) *Do you know what being environment friendly means? Can you explain what it is?* This question was very important because it showed how the participants defined sustainability. Following this question, they were asked: (v) *Think about your morning or afternoon routine and describe what is environment friendly about it.* They would then put a colored circle at the places where they were doing sustainable actions. This activity aimed at understanding what children can do to be sustainable in their houses and where these actions are situated.

The second phase of the study started with a second drawing. The guidelines were: (vi) *Draw the most*

environment friendly house that you can imagine. The idea behind the second drawing was to investigate what children know about sustainability. When they were done, they were asked: (vii) *Explain what you drew, focusing particularly on the environmental friendly features.* By asking them to explain their drawing, the interviewer was able to understand the meaning of the features on the drawing. This last question was particularly pertinent because it allowed the participants to visually explore their own ideas and to clearly present their understanding of sustainability.

Findings

Representation of houses

The drawings could be separated into three main categories: floor plan, front view and front view with embedded floor plans. This last category was used to display everything the children wanted to share and explain, (figure 1). They also used secondary views to show more detailed top plans of certain floors. Most of them were not very precise in following a specific scale for objects, room divisions and layout of the house. Finally, some of the participants used words and labels to describe and clarify certain features.

Children have their own way of representing space, particularly the space they know. They were able to use their drawings with ease to walk through their morning and afternoon routines. If they had forgotten something, and remembered it while describing the routine, they would simply, and spontaneously add the feature where it was suppose to go. For example, P6 explained how he composted and then realized that he did not draw the compost bin outside the house and added it ad hoc.



Figure 4. Solar panels surrounding the house and windmill are producing energy to power the house.

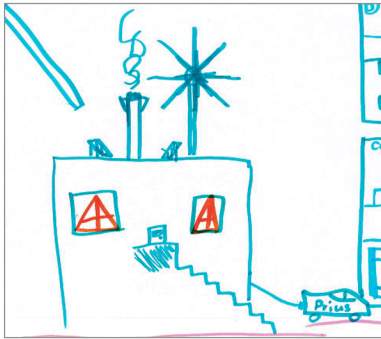


Figure 5. Alternative way for transportation. Prius, hybrid car.

How do children define sustainability

Children's understanding of sustainability was collected through the drawings (discussed in the following sections) and the two following questions. "*Do you know what sustainability means?*" and "*Do you know what being environment friendly means?*" For the purpose of this study, environment friendly will be defined the same way as sustainability. All but one participant did not know what sustainability meant. To the second question, most of the participants were able to give an answer that fits within the general definition of environmental sustainability. The answers included words such as: *make a difference, be helpful, don't harm the environment, caring and help the environment, and not polluting*. The answers also contained examples of sustainable behaviors such as *don't leave the tap running, recycling, using renewable energy and biking or walking to school*.

Current sustainable activities in the home

When asked to explain their routines and sustainable actions with the current house drawing, most children were able to remember their actions and to explain what sustainable actions they are doing daily. The lines representing the paths the participants were following through their morning and afternoon routines are indicators of valuable places in the houses where children take action (Figure 1). The kitchen, the washroom and their personal bedroom are places where the children were able to situate sustainable actions. Saving water was very important to the participants and all but one mentioned that they don't let the tap running while they brush their teeth. Some participants also mentioned that they would tell their parents to turn off the tap when they are washing their teeth or washing vegetables. P6 also explained his

Shower Coach. It is an hourglass that gives you a certain amount of time to take your shower. P6 was very enthusiastic about this tool. He also said that he is trying to convince his mother to use it, and that after saying she didn't need it, she agreed to try it. We can observe that water consumption was a concern for both parents and children, and that they tried to transfer this awareness to each other. Electricity is also a topic that children brought up while talking about their drawings and their routines. Using the lights only when they are necessary and turning off the television after using it were part of the habits and rules in the houses the children were living in. In addition, waste, recycling and composting were issues that children brought up when describing their routines.

Representing the ideal sustainable home

In the second drawing, the goal was to investigate to what extent the participants knew what could be done to have a more sustainable house. In all the drawings, the children presented one or more alternative ways to collect energy in order to power the appliances in the house (solar, wind, or a combination of both), (figure 4). P2, P4, P6 and P7 depicted different ways for transportation. Instead of a traditional combustion car, they drew bicycles, hybrid cars and electric cars (figure 5). Also, P1, P2 and P7 addressed the issue of local, organic and chemical-free food.

The interiors of the houses, when represented, were not significantly different than the interiors drawn in the reality drawings. Most of the changes were either outside or in a system that could not be seen. P7 said: "*It's just a normal house, but what makes it so special is that everything is powered by wind and solar energy.*" This quote suggests that most of the energy

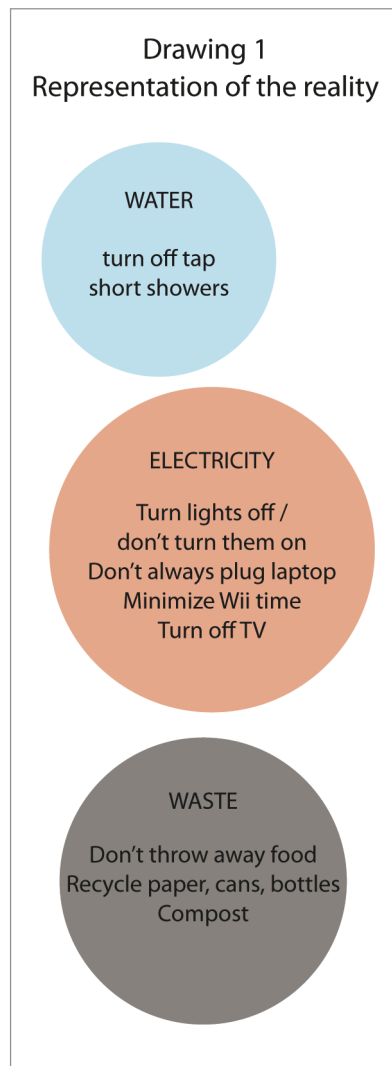


Figure 6. Affinity diagram.
Sustainable actions taken in the
current house.

and water management that happens in the house is invisible. Even though children can point out where consumption happens, there is no information about where it comes from and how much is used. This can be a great starting point for developing EVs for children that would show them how their house works *behind the scenes*.

Children see things in a different perspective and can bring out ideas that are not obvious to designers. For example, one participant (P1) proposed: *"it's like this main switch button, [...] if you want to use the electricity through the whole house, you press this button, and you flick on a light, and it'll work, and if you don't press that button, it won't turn on"* This idea suggests that children do respond to *widgets* and abstract representations. Here, the button would be one way to initiate a sustainable behavior through an electronic device. P3 and P6 also put forward the idea of an automatic way to close the lights and water if it is going on for too long and nobody is using it.

Comparing reality with the ideal

The environmental friendly actions and features drawn and described by the children in their two drawings differed considerably. The next figures (figures 4 and 5) are two affinity diagrams combining all these actions depending on what area they are related too. These diagrams serve as starting points for the analysis. Overlaps between circles show similar ideas were shared between the two categories. The affinity diagrams were helpful to visualize the areas the children were aware of and the points of intersection that can be new starting ideas for future EVs.

The main areas discussed by the children in the first drawing were precise actions related to water, electricity and waste (Figure 6). In comparison, the second drawing gathered more areas of action: water, electricity, waste, size, energy, food, polluting products, and transportation (Figure 7). Here, children thought more about infrastructures and global ways the house should work. The scale of these actions is variable and can range from the very specific (Shower Coach) to a very holistic vision (the type of energy used to power the house). In the second drawing's affinity diagram, intersections can be observed between the different groups of actions. This enforces the idea that the participants have a broad and open understanding of what environmental sustainability is, which would be a major point to address while thinking about EVs for children.

Implications for design

This was a pilot study to investigate how EVs could be designed for children. The results indicate that the drawing and telling technique can be a successful method to explore how children see their homes. The same framework could be used to ask children more focused questions on how they represent the amount of electricity or water their houses are consuming. This could bring ideas about how to design EVs for them.

Since children have been found to be proactive in changing family behaviors [3], sustainable interaction design must consider the collective impacts EVs have on sustainable practices in the home. EVs should be designed to be used and understood by both children and parents, creating opportunities for everybody to contribute to the sustainable actions in the house.

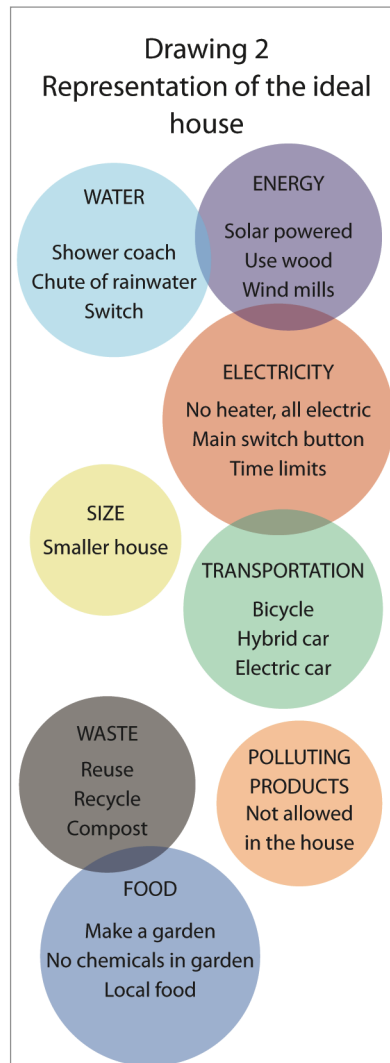


Figure 7. Affinity diagram.
Sustainable actions taken in the ideal house.

The variety of areas addressed by the participants in their drawings show that their understanding of sustainability is more than electricity and water consumption – it includes the food we eat and the products we use for example. Therefore, the design of EVs for kids should consider these factors and integrate them in the family’s daily routine. The drawings also showed that children have a different sense of scale and perception of space (use of front and floor plans simultaneously). Designers should take this into consideration while imagining how to represent data about sustainability in the house.

While drawing, the participants of each group were very quick in sharing ideas and concepts. We see this collaboration and exchange of ideas as a crucial point in the design of future EVs for children and how it could inform networking and multi-user possibilities. EVs should allow children to share strategies and results within the family and with friends in different houses.

Conclusion and Future work

In this study, it was demonstrated that children between 10 and 13 are aware of environmental actions they can take in their house in order to be more sustainable. By using the drawing-telling technique, it was possible to collect their representation of sustainability in their house and an ideal house. These observations and the drawings and recordings were then classified in an affinity analysis to refine the discussions around the design of future EVs.

This pilot study can serve future work, particularly the design of eco-visualization tools for children. The pilot study can be seen as a first step in the direction of considering the impact children can have on their

family’s habits. Future work should include the evaluation of existing eco-visualization tools when used by children. This would point out more precise points to change, ameliorate or de-emphasize to create eco-visualization that are more effective for children and families. Beyond the immediate concern of children’s perspectives on sustainability, the implicit value of this type of study on children’s view is to catch a glimpse of the ongoing understanding and future emergence of the needs and desires of sustainable actions.

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References

1. He, H. A., Greenberg, S., & Huang, E. M. (2010). One size does not fit all: Applying the transtheoretical model to energy feedback technology design. In *Proc CHI’10*, ACM Press. 927-936.
2. Kenney, K. (2009). *Visual Communication Research Designs*. New York: Routledge.
3. Knafo, A. and Galansky, N. (2008). The Influence of Children on Their Parents’ Values. *Social and Personality Psychology Compass*, 2: 1143–1161.
4. MacDonald, A. (2009). Drawing stories: The power of children’s drawings to communicate the lived. *Australasian Journal of Early Childhood*, 34(3), 40-49.
5. Pierce, J., Odom, W., & Blevis, E. (2008). Energy aware dwelling: A critical survey of interaction design for eco-visualizations. In *Proc Australasian Conference on Computer-Human Interaction: Designing for Habitus and Habitat’08*, ACM Press. 1-8.
6. Wright, S. (2007). Graphic-narrative play: Young children’s authoring through drawing and telling. *International Journal of Education & the Arts*, 8(8), 1-28.