Designing with Teens

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ABSTRACT
In this paper we explore the unique challenges and rewards of engaging teenagers in the design process. This work is part of project engaging teenagers in reducing their energy use and making longer lasting changes in energy usage attitudes. This change will be achieved though the creation of mobile and wearable 'teen' technologies that make energy use visible, provide targeted educational material, and create a community of teenagers collaborating and competing to reduce energy use. Careful design of these technologies is crucial to ensure successful adoption and appropriation. While participatory and user-centered design approaches are widely used with adults their use with teenagers is far less commonplace. Running design sessions with teenagers brings four interrelated challengers we discuss in this paper: engaging teens in the design activity, 'speaking' their language, capturing the rich ideas generated, and analyzing ideas to produce the most useful outputs. These four issues are explored in detail through the creation, execution and analysis of a design session carried out with four groups of teenagers across two age groups.

Categories and Subject Descriptors
H.5.2 User Interfaces: *User-centered design, Prototyping.*

General Terms
Design, Human Factors.

Keywords
Teenagers, Design, User Centered Design, Energy, Prototyping.

1. INTRODUCTION
Within the past 20 years there has been a steady increase in the number of appliances in the modern home coupled with growth in the ownership of energy hungry devices (such as plasma TVs) and an increase in the use of devices with standby facilities [3]. Many of the electrical devices contributing to the rise in domestic energy are used and often owned by teenagers. A recent study in the UK surveying 400 teenagers aged 13 to 19 reported that they collectively wasted enough energy to power 4,702 schools, and furthermore, a third of the energy being used was a direct consequence of 'standby' behaviour [1]. The context of this work is a three-year project aimed at designing and developing technologies that change the way the teenagers think about and use energy (www.mad4nrg.org). The intention is to persuade teenagers to adopt an eco-friendly lifestyle and help them to build up some positive habitual behaviour on energy saving which will last through their adulthood. Central to this project is an emphasis on exploring how best to design interactive technology, interactivity and interfaces that appeal to a large section of the teenage population. These technologies are expected to include, but are not limited to, mobile and wearable devices, situated sensors, web services, e.g. social network, and augmented reality. These technologies, termed MAD (Make a Difference) devices, will be created to inform and teach teenagers about their energy use. They will allow teenagers to have automated input from sensor technologies via mobile networks, will allow additional data to be input manually from either static sensors or from other data capture methods (for example miles walked), and will include educational material appropriate to the application being designed.

The project team made an early commitment to work directly with the eventual end users of the technologies in order to better understand teenage motivations and ideals, to gather ideas and opinions from teenagers and to ignite teenage enthusiasm and acceptance. A key dimension of this work is the design of technologies which can be appropriated by teenagers in 'cool' ways [7]. There is little literature on designing with teenagers with only a few studies reported [2] [4], the majority of studies focus on younger children or adults [5]. Designing with teenagers can have its own issues such as giving the teenagers appropriate information to achieve the best results and not biasing the studies with too much information or researcher bias. Further issues arise in the interpretation of the results where the research team needs to address important issues such as separating the possible from the impossible, the mad from the genius, identifying recurring themes, and selecting the best ideas. In this work we utilize Obstructed Theatre [8] as a method of conveying functionality required in a device without actually showing its look and feel by the use of video clips, greatly reducing the number of potential design features exposed to the teenagers before the design session.

In this paper we present the results of a study carried out with two year groups in two UK high schools where the children were challenged to design novel energy feedback systems that teenagers could incorporate into their daily lives. We start by introducing the design of the study. We then present the results and the process in which the teenagers ideas were analysed before discussing the important and interesting finding from the process.

2. STUDY DESIGN
The purpose of the study was to gather design ideas for a device to provide feedback on energy use which could provide notification on good/bad energy behavior and allow comparison

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of energy use between friends. The sessions, each lasting 50 minutes, began with an introduction to the task and the showing of a short obstructed theatre video which highlighted the usage scenarios (designed and created with input from a teen informant with simple cartoon stick figures). The sessions were run in year 7 and year 10 classes at 2 different schools in North West of England, the participants worked in groups of 2 with a teacher and members of the research team present. The designs were recorded on a 5 page paper booklet, on the first page was used for the initial design idea while the remaining pages were used to show notification on good/bad energy use, to show how comparison was achieved and for and other information.

3. ANALYSIS

In order to analyze the 41 designs collected they were first split into 10 groupings of between 3 and 5 booklets (all from the same class). Within a grouping each design was considered individually and the 'best' ideas recorded, a list of the best idea from that grouping was then made. The criteria used to select design ideas by the team was 'ideas to inspire the design of an engaging mobile/wearable energy awareness application for teenagers'. The analysis was carried out by a team of four interaction designers with experience in designing and evaluating with children. The analysis was first carried out individually for all 10 groupings, the team then came together to compare results and agree the 'best' design ideas from each grouping (the results of this are shown in Table 1). The use of small grouping gave fewer designs to compare at one time, simplifying the process and reducing the risk of good design ideas being overlooked in such a large volume of data. As can been seen from table 1, the final list of design ideas ranges from complete products to ideas for aesthetics and interaction.

Table 1. Final list of design ideas

Group	Description
1	Interactive T-Shirt with built in display and speakers
2	Locket with device functionality inside
3	Device that annoys you until you reduce your energy use
4	Devices fight each other and person using least energy wins
5	To activate the device you shake it
6	Stickers are awarded for good energy use (themed)
7	Whole device changes colour (red and green)
8	Point awarded or deducted depending on energy use
9	Energy targets given that you must try to hit
10	Wrist watch with energy functionality built in

4. DISCUSSION

Form the rich set of diverse designs collected it was clear the teenagers engaged with the activity. During the sessions the teenagers had little trouble understanding that they were designing a device to convey and investigate energy usage, although a small minority of groups (2 out of 41) designed devices intended for showing personal physical energy usage rather than electrical. The majority of the participants used every page of their booklets, ensuring that in addition to overall aesthetics the design of associated user interaction and user notification were shown. Analysis of the results, as described in the previous section, gave a set of novel and engaging design ideas as expected. However, the designs also highlighted a common set of more pragmatic design features which appeared many times. This included solar panels to power the device, a graphical display of some sort, methods to physically connect 2 or more devices together, a method for finding help/suggestions to improve energy use, and mobile phone 'shaped' devices (thin and rectangular). While the study was not designed specifically to gather these less innovative features they provide valuable input into the design process and provide insights into shared opinion on design features the teenagers expect.

The study described in this work engaged teenagers in design through the creation of a simple, flexible and informal activity that created a rich set of design ideas. Obstructed theatre, heavily influenced by a teen informant, was used to help the participants understand and relate to the functionality to be included in the design. The use of a paper booklet proforma captured initial design ideas then guided the participants though probing the idea further to consider aspects such as notification and interaction. This proved effective as the teenagers carefully considered how to extend their design for interaction and information display. The analysis process used ensured that each individual design was considered and produced a set of engaging design ideas to be taken forwards, which were unanimously agreed upon by the team. In addition, participation in the process was also valuable in prompting interesting discussion, inspiring new design ideas and reflecting on the process. The findings from this study will drive the design of the first MAD prototypes and the later stages will, of course, involve further involvement from our teen target users.

5. REFERENCES

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