Scaffolding Design Sessions with Teenagers: The PDA Approach

Daniel Fitton
ChiCI
University of Central Lancashire
Preston, PR1 2HE UK
dbfitton@uclan.ac.uk

Matthew Horton
ChiCI
University of Central Lancashire
Preston, PR1 2HE UK
mplhorton@uclan.ac.uk

Janet C Read
ChiCI
University of Central Lancashire
Preston, PR1 2HE UK
jcread@uclan.ac.uk

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Abstract
Participatory design (PD) methods generally provide little guidance/reporting on how the tasks are introduced to participants and how they are supported in carrying them out. It is assumed that researchers or practitioners already have significant expertise in this area and will be capable of adapting any methods for their own specific purpose. This area, of understanding how a participant is guided through a design task, is particularly important for child and teenage participants who may be unwilling, for a range of reasons, to admit they do not understand a task and ask for help. This paper introduces an approach (called Primed Design Activity or PDA) used to help prime participants in a design session, the key aim of the work was to scaffold the introduction and completion of a PD task without biasing the outcome. The study reported in this paper showed that the approach was successful in assisting participants in completing the design task, the paper also draws more general conclusions and lessons learned from the work that are valuable to others running PD sessions.

Author Keywords
Participatory Design, Interaction Design, IDC, Teenagers.

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

Introduction

Participatory approaches involving users in the design of technology have long been identified as important within the HCI and IDC (Interaction Design and Children) communities. Many different techniques have been developed, many originating from, or inspired by, the Scandinavian Approach [1] and within the IDC field, Druin recognized the value of children as design partners and pioneered the Contextual Enquiry method [2]. Design methods have been a key focus of the IDC community [3] and while more traditional methods have been adapted a growing number of novel and child-centric methods have been developed. Recent work has begun to specifically consider teenagers as being different from both adults and children [4]. Often when working with children and teenagers the key challenges when using participatory techniques are ensuring that the participants fully understand the design tasks that they are asked to engage in, and that suitable outputs are captured in the design sessions. These issues are unlikely to be problematic when carrying out ongoing work (working with the same group of participants over extended periods) but when working with large numbers of participants who may not have had prior experience of involvement in research studies they are more prevalent. The two issues directly affect the potential value or usefulness of a participatory-design session and can be especially acute when working with young participants who, unlike adults, may not make it clear to facilitators that they are unsure of the task given to them. Design sessions that fail to engage participants or gather useful outputs are rarely reported in literature and, while a valuable learning experience, can represent little return on a large investment in time and effort. These risks are mitigated with experience of working with the participant group but the work presented here seeks to develop an approach that can help the research community provide more focused activities that enhanced collection of useful outputs from running a design study. The approach explored in this paper used a range of techniques to scaffold the activities carried out by teenage participants, minimizing the ambiguity over the design task and output to be produced.

Related Work

Design work with children has been considered extensively with the IDC community, Yarosh et al [6] found that 43% of IDC submission between 2002-2011 focused on a design-based contribution and this was representative of an emerging trend. However there is often little practical advice provided to those wishing to use design methods with children, this was highlighted by a recent work on the FACIT-PD framework [7] providing practical advice on choice of PD methods. Other work such as the Bluebells methods by Kelly et al [5] has considered the wider context of a design session, including activities before and after involvement of the children, but this area has not yet been explored extensively.

Issues within Design Activities

When designing a new study it is essential to carry out a pilot study to reduce the potential for problems and issues that could occur. Even with this, working with diverse groups of participants such as children and teenagers, from different backgrounds and economic

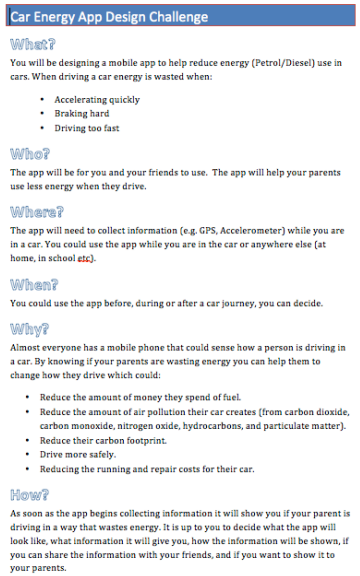
statuses, unforeseen issues may still arise. The goal of this work was to address key issues that the authors had experienced through their running of design sessions with a wide range of participants with children and teenagers on a range of projects, these were:

Participant understanding of design tasks. Often when working with younger participants misinterpretation or confusion can arise over what, why, or how a task should be completed. In a situation where participants are unsure how to begin an activity they may be unwilling for seek help from facilitators or teachers and may resort to divergent activities such as doodling or colouring to pass the time whilst appearing as through they are engaged in the activity. Occasionally participants may also resort to diverting and disrupting behavior [8]. In these cases careful observation and tact is needed on the part of the facilitator in order to intervene and encourage the participants to engage in the activity in a meaningful way. Participants may also begin an activity with unexpected misunderstanding of the instructions or more general context. For example, the authors recently conducted a study relating devices for visualizing electrical energy in the home and in one design session (with participants 12-13 years) it became apparent that the participants were considering personal energy use, after discussion with the class teacher it transpired that this was a topic that was being covering in classes.

Suitable and useful outputs captured. It is usually necessary for participants to fully engage with a design activity and complete specified tasks correctly in order to generate the desired outputs. This relies on the participants being willing, able, and committed to complete the tasks. Timing can be problematic when working with children and teenagers, and, when constrained by working in schools, problems arise if participants take too long to complete a task. Additionally, participants can easily become bored if a task takes too long or can lose interest if a task is tedious. Often in design sessions the researcher is looking for outputs that provide new insights and ideas form the participants and another challenge is to encourage divergent thinking and avoid replication of existing designs. The authors have found that often participants in design sessions generate interesting ideas in discussion but these are not always captured when drawing or writing about them. When working with groups of children there is often debate over which member of the group has the chore of writing/drawing followed by uncertainty over how the ideas can be represented and conveyed. The authors typically find it necessary to facilitate participants by discussing their ideas and ensuring that they are captured in a form that can be taken away from the session for analysis.

The Primed Design Activity Approach

In order to address the issues identified in the previous session a design approach was taken create both the optimum experience for participants in the design session and help ensure the creation and capture of useful outputs. The context of this work was a mobile application to help teenagers understand energy use within cars; this work was part of a research project exploring reduction in teen energy use. Within the project the design of energy visualizations for static displays had already been explored and the aim of the design session was to explore both visualization of car energy use (where the user of the app would not be the driver) and use of the



Car Energy App Design Challenge

What?

You will be designing a mobile app to help reduce energy (Petrol/Diesel) use in cars. When driving a car energy is wasted when:

- Accelerating quickly
- Braking hard
- Driving too fast

Who?

The app will be for you and your friends to use. The app will help your parents use less energy when they drive.

Where?

The app will need to collect information (e.g. GPS, Accelerometer) while you are in a car. You could use the app while you are in the car or anywhere else (at home, in school etc).

When?

You could use the app before, during or after a car journey, you can decide.

Why?

Almost everyone has a mobile phone that could sense how a person is driving in a car. By knowing if your parents are wasting energy you can help them to change how they drive which could:

- Reduce the amount of money they spend of fuel.
- Reduce the amount of air pollution their car creates (from carbon dioxide, carbon monoxide, nitrogen oxide, hydrocarbons, and particulate matter).
- Reduce their carbon footprint.
- Drive more safely.
- Reducing the running and repair costs for their car.

How?

As soon as the app begins collecting information it will show you if your parent is driving in a way that wastes energy. It is up to you to decide what the app will look like, what information it will give you, how the information will be shown, if you can share the information with your friends, and if you want to show it to your parents.

Figure 2: 'Phone Pad' for drawing mobile user interface designs.

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app within the context of a teenage peer group. A realistic scenario involving car travel (being driven by a parent) was used in the design task, a scenario that would almost certainly be encountered by the participants on a regular basis. An approach was sought that facilitated the participants in thinking about possible designs that would fit in with their existing daily routines. It was important that the approach could be used in short (20 minute) sessions with small groups of participants (2 or more) within school classrooms with children aged 11-15 years.

The approach developed in this work utilized a range of techniques in four key steps. A 'Five Ws and one H' sheet (Figure 1) was produced that very concisely described the What, Who, When, Why and How (5 Ws) of the application being designed to clearly convey all salient information about the purpose and context. This was used by the facilitator at the start of the activity to give a consistent and complete introduction to the application being designed. A copy was given to each participant for use during the task for reference. Secondly, an 'Ideas' task was given to the participants to complete in groups this explored how the mobile application they envisaged would be used. This was a single sheet of paper that proposed the participants with 5 questions and had space for them to write down their ideas. The questions related to how their app could provide feedback, allow comparison with friends, provide feedback to parents, and support behavior change. Thirdly, a sketch representing a scenario (Figure 1) printed on a large A3 piece of paper was given to participants. The scenario was represented in the form of simple sketch showing movement through time and space, including the key events where the proposed app may be used or provide notifications to the user. The events correlated with the 5 questions from the 'Ideas' task earlier. The scenario sketch emphasized the actors in the scenario to help the participants think about the potential social dimensions of the application. Clear directions and explanations for the design task (use by the facilitator to describe the task) were included on the reverse side of the scenario sketch sheet. Fourthly, the participants began the task drawing screen designs for their application in each of the different events and situations shown in the scenario sketch. To draw the screens each group had a 'phone pad' (Figure 2) which was constructed from acrylic sheet with a pad of Post-it notes in the center. This 'phone pad' approximated a mobile phone, with rounded edges/corners and similar size to a modern device, and enabled the participants to show their screen designs to each other in the same way that they would show each other their actual mobile devices. Participants would draw on the Post-it notes then stick them onto the Scenario sketch in the appropriate place where the interface would be shown.

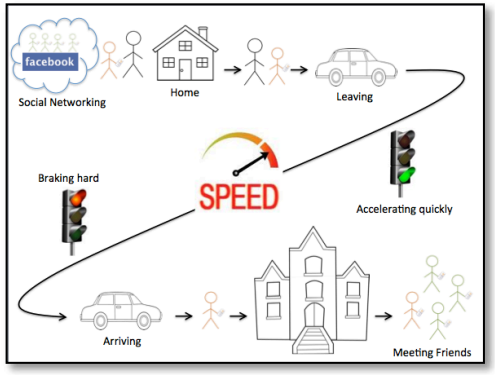

Figure 1: Scenario Sketch

Steps 1, and 3 aimed to address the issue of participant understanding (enabling a clear understanding of the design task and context). While steps 2 and 4 aimed to ensure that suitable and useful output were generate and captured.

Evaluating The PDA Approach

A pilot was carried out with 4 groups of 2 participants aged 11-12 in a school in the UK. Initially two scenario sketches were used of travelling from home to a place where the participant would meet their peers (ie school, or out of school activity), and travelling home again. The participants found the second scenario sketch too similar to the first and as they yielded new ideas or insights the study design was altered to use a single scenario sketch. In the pilot the 'Ideas' sheet was not used and the participants resorted to annotating the scenario sketch to include textual description. The pilot confirmed that the task context (conveyed using the What, Who, Where, When, Why, How sheet) was understood, that the task was achievable, and that the scenario sketch was realistic. This was evidenced by the participants completing the task correctly after minimal introduction and needing no additional guidance from the facilitators, an example completed design is shown in figure 4. A range of interesting design ideas were created by the participants and these focused on providing feedback and summary energy usage information.

The study was run again with 44 participants from 2 schools aged between 11-14, participants worked in groups of 2, with 2 groups working simultaneously with the same facilitator. The study took approximately 20 minutes to complete. None of the participants had worked with the research team

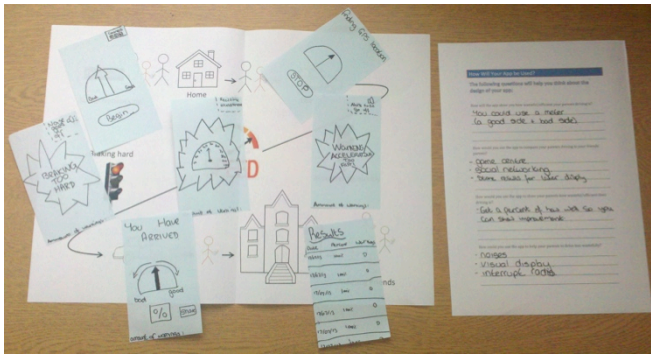

Figure 4: Output from Main Study showing completed scenario sketch and design ideas.

previously. No further changes were made to the design of the study. The data collected from the studies included the scenario sketch with Post-it notes showing mobile user interface designs for the user placed by the participants (indicating when each interface would be shown to the user), along with the sheet containing the design ideas written at the start of the task. All participants used multiple Post-it notes to convey their ideas, the groups that used fewer Post-it notes included more textual description. A set of common themes emerged which included a leaderboard for comparison, a gauge model for feedback, and integration with satnav functionality.

Discussion

The findings from running the main study showed that the original aims of this work had been met. The participants had no apparent ambiguity or uncertainty of the context of the task or how to carry it out. All groups created outputs of value to the design team which were of direct use (specific interface designs, design concepts, and potential mechanisms for

application functionality). All designs produced were intelligible, explaining how the application would function in specific contexts and showing potential user interface designs. Scaffolding design activities has an inherent tension between answering specific questions and constraining the designs produced. It is possible that using different scenarios or allowing participants to create their own car journey scenario may have produced different design outputs. Without careful consideration scaffolding risks biasing the outputs form the session.

The work presented here attempted to address key issues the authors have encountered when running design studies with children and teenagers. The scaffolding techniques used here attempted to influence the pragmatic elements of the design sessions (using the 5 Ws sheet for understanding of context and task, and supporting graphical and textual expression) and focus the design effort (using the Ideas task, scenario sketch, 'phone pad', and placement of Post-it notes). The intention of this influence was to carefully prime the participants to make the design activity as effective as possible in a short period of time whilst also collecting valuable outputs. We hope that others may find adopting a PDA approach valuable in their work.

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