Methods for Technology Enhanced Learning Design with Teenagers

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Abstract
This paper discusses insights into methods for working with teenage participants. Our discussion draws on two case studies in the design of technology enhanced learning experiences to support learning about personal energy consumption. We discuss the use of methods, which are common with adult participants (photo diaries, questionnaires, small group discussion), for understanding teenagers' out of classroom contexts and attitudes about energy consumption.

Author Keywords
Technology enhanced learning; teenagers; context; participatory design

ACM Classification Keywords
K.3 COMPUTERS AND EDUCATION

Introduction
The work we discuss is part of a strand of research to design and develop technology enhanced learning (TEL) experiences to support teenagers' learning about their personal energy consumption. In this paper, our focus is on the methods we used to engage with teenagers. Our work forms part of a larger, inter-disciplinary project ('Taking on the teenagers') between five UK universities.

A central aspect of our approach is to design technology that is grounded in an understanding of the learner's context. The design of our methods is guided by the Ecology of Resources design framework [3].

Participatory design framework

The Ecology of Resources (EoR) design framework [3] is inspired by a sociocultural philosophy to understanding and supporting learning [5] and the notion of scaffolding [4, 6]. The EoR provides a method for designing learning technology and/or learning technology use that considers the learning that arises out of the learner's interactions with their context. The EoR provides a method through which we first identify the world resources available to the learner and the processes and relationships that shape the learner's access to these. We also build an understanding of the learner and what they bring to the learning experience: their personal resources. The EoR also introduces the notion of *filters* to describe the artefacts that constrain a learner's access to resources, such as regulations or boundaries. Having mapped out the learner's context we begin an iterative *participatory* process of design with the aim of developing technology that facilitates access to appropriate resources at appropriate times during the learning process.

Studies with teenagers

Our exploration of teenagers' context to design TEL experiences about their personal energy consumption has involved several research questions and methods, guided by the EoR [1, 2]. Due to space constraints, in this paper we concentrate our discussion on the first 2 studies, carried out in separate schools. We also limit our discussion to a subset of methods, which were designed to explore two central aims: to identify a) energy consumption and resources about energy consumption in teenagers' out of school context, and b) teenagers' attitudes towards and understanding of energy consumption.

Participants

Study 1 involved a group of 14 teenagers (aged 14-16; 5 female and 9 male). Study 2 involved 41 teenagers (aged 14; 23 male and 18 female), split into 2 groups.

Method

STUDY 1: PHOTO DIARIES & SMALL GROUP DISCUSSION

We designed an open-ended activity that would not prescribe the kinds of things teenagers identified as relevant to energy: creating a photo diary of a day in their lives. We also dedicated a separate session to the ethical issues of anonymity in taking photos. The photos from the diaries were revisited in a subsequent session (2 days later). Participants worked in groups of 3-4 and took turns in creating a narrative from the photos by laying them out as a storyboard. Within the group each teenager was assigned a role of interviewee (the person whose diary was being discussed), interviewer or notetaker. The interviewer was given guiding questions to help create the storyboard. Once the narrative was complete we discussed the activities (captured in the photos) through the lens of energy consumption. We explored teenagers' understanding of energy-related issues, their attitudes and behaviour. As before, each teenager in the group was assigned roles.

STUDY 2: QUESTIONNAIRES & SMALL GROUP DISCUSSION

Participants given a questionnaire on their attitudes, understanding and behaviour related to energy consumption. The questionnaire included both closed

and open questions. During a subsequent session we engaged with participants in small group (3-4 per group) discussion around the same topics. The discussion was structured around group activities that required them to write down key points about their attitudes, understanding, and behaviour related to energy consumption. As in Study 1, we prompted participants to take roles in coordinating the discussion.

Reflections on use of methods with teenagers

IN-SCHOOL STUDIES TO CAPTURE OUT OF SCHOOL CONTEXTS

The focus of our research was to capture out of school contexts that relate to personal energy consumption, as well as attitudes and understanding about energy consumption as a 'real world' issue. However, our work with teenagers took place in the classroom, as it is most feasible to contact participants through schools. There were indications that the school context influenced the framework within which participants were thinking: when discussing their understanding of energy consumption the reference point was schoolwork. For example, reference was often made to the content of science lessons. Even though participants listed other sources of information (TV, leaflets), information from them was not referenced in their discussions. This appeared to be the case in both studies, even though the photo diary study involved explicit references to personal out of school contexts. It may be the case that school curriculum would be the reference point of knowledge for teenagers even in out of school contexts. However, future work could explore the design of methods that support the creation of a frame of reference that is not constrained to the school context when working with teenagers.

EXPECTATIONS OF DIRECTION FROM ADULTS

Related to the above point, we sensed that the school context impacted on the degree to which we were able to hand over control to the teenage participants. Teenagers are used to being directed in the classroom. In contrast the group methods we used in both studies aimed to give the role of facilitator to them. Even though we provided support to participants in adopting facilitator roles, we were not entirely successful in overcoming expectations that we would give direction.

EXPRESSING OPINIONS

About half the participants did not respond to the open questions in the questionnaire about their attitudes and understanding, indicating they were unsure of the reasoning behind their views (which they expressed in the closed questions). However, they elaborated on their attitudes in the small group discussions. The reasons behind this are unclear. It is possible that expressing their thinking in the questionnaire was more difficult or perceived as more definite. Perhaps they were more comfortable expressing opinions they were unsure about in a group context. Further work is needed to compare different methods for engaging teenagers in expressing their attitudes and opinions, particularly when these are not well formed.

ETHICS IN TEENAGE-LED DATA COLLECTION

The participants appeared to be comfortable with sharing information about themselves, including photos. It is likely that many teenagers are used to sharing personal information. In the diary activity, it was important to discuss ethical issues in capturing information about each other, and engage in an activity to practice taking photos while maintaining anonymity.

Conclusion

We have presented a subset of our work with teenagers using methods that are common with adult participants. The studies were not designed to explicitly compare different methods. We have not drawn definite conclusions, but our experience of working with teenagers has led to insights that can guide future work.

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References

[1] Avramides, K., Craft, B., Luckin, R. and Read, J.C. (2012) Working with teenagers to design technology that supports learning about energy in informal contexts. Proc *Intl Conference of the Learning Sciences.*

[2] Avramides, K., Craft, B. and Luckin, R. (2012) From kinetic energy to climate change: Design of technology to link school science to personal energy consumption. Proc of the W*orkshop on Emerging Web Technologies, Facing the Future of Education in conjunction with www2012*

[3] Luckin, R. (2010). *Re-designing Learning Contexts: Technology-Rich, Learner-Centred Ecologies*. London and New York: Routledge.

[4] Pea, R.D. (2004). The social and technological dimensions of scaffolding and related theoretical concepts for learning, education, and human activity. Journal of the Learning Sciences, 13, 423-51.

[5] Vygotsky, L. S. (1986) *Thought and Language*. Cambridge, MA, MIT Press.

[6] Wood, D. J., Bruner, J. S. and Ross, G. (1976) The Role of Tutoring in Problem Solving. *Journal of Child Psychology and Psychiatry, 17*(2), 89-100.

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Rosemary Luckin is Professor of Learner centred design at the London Knowledge Lab, University of London. She has previously held the following posts at the University of Sussex: Pro-Vice-Chancellor (Teaching and Learning), Director of the Human Centred Technology research group. She has written over 50 peer reviewed journal papers and book chapters, a research monograph and numerous conference papers. Her research explores how to scaffold learning across multiple technologies, locations, subjects and times through the application of participatory methods to the development and evaluation of Technology for learning. This work is interdisciplinary and encompasses Education, Psychology, Artificial Intelligence and HCI. The total value of the research grants funded to date is in excess of £10 million (with £3 million awarded to her home institution).