Teenagers re-design a collaborative mobile app to kindle motivation for learning about energy consumption

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Abstract: Previous work informed the design of a collaborative mobile application to support learning about personal energy consumption. In this study teenagers used and re-designed the application. Collaboration with other members of society emerged as a potentially significant motivating factor. Findings also indicate participants were not clear how energy issues will affect them, which might impact on motivation to learn. The work contributes to our understanding of how to design collaborative learning technologies about energy consumption that are motivating to teenagers.

Introduction

Little is known about teenagers' conceptions of the issues around energy consumption. Some evidence suggests that, although teenagers show awareness of energy problems and report concerns about the future, they lack awareness of their personal energy consumption and also lack motivation to learn how it contributes to global issues (Avramides, Craft, Luckin and Read, 2012). Studies with adults also suggest there is a lack of awareness regarding the connection between environmental issues that arise from energy consumption and individual consumer choices (Lorenzoni, Nicholson-Cole and Whitmarsh, 2007). It is, therefore, important to highlight to teenagers how individual choices form a pattern of personal energy consumption over time, and relate to larger scale energy issues. Collaborative learning experiences might be effective in drawing this connection between individual and global, and support learners in understanding how their individual behaviour is part of a collective pattern of behaviour. Technology can effectively support collaborative learning, particularly when the collaborative element is embedded in the design (Lewis, Pea and Rosen, 2010). Building on previous findings (Avramides, Craft, Luckin and Read, 2012), we designed a prototype mobile application to support teenagers learn about their personal energy consumption. The application was designed to support a collaborative learning experience. The focus of the present study was on motivation: what design would motivate teenagers to learn about energy.

Framework for Learner Centred Design

A methodology that identifies the multiple influences upon teenage decisions and behaviours, and that draws connections between their circumstances, motivations, attitudes and knowledge is required for the design and use of technology to support learning about energy. This methodology needs to be participatory in order to ensure that a clear and accurate understanding of the complex influences within their personal contexts is integrated within any resultant design. The Ecology of Resources design framework (EoR, Luckin, 2010) offers a process for working with participants that models and takes account of 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 rules, regulations or physical 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. The EoR design process offers a *3 Phase structure* through which educators and technologists can develop technologies and technology-rich learning activities that take a learner's wider context into account (see Luckin, 2010 for framework detail).

Study Aims and Research Questions

In this study we focussed on Phase 3 of the EoR (development of scaffolds to support learning). Based on our findings from Phases 1 and 2 we developed a prototype mobile application, as a prompt to engage teenagers in the design process. The participants used and then re-designed the app. The research questions were exploratory. We examined both (1) the participants' use of the prototype application we gave them, and (2) their ideas for re-designing it. The focus of the re-design was on motivation. The lack of motivation to learn about personal energy consumption was a key issue we identified in previous studies. Specifically, we explored what would motivate teenagers to engage in terms of (a) the type of activity, and (b) the type of reward for engaging in the activity.

Participants and procedure

We engaged with two UK schools. In group 1 there were 7 students (aged 14 years old; 4 male) who had recently finished a school project on citizenship and energy consumption. In group 2 there were 6 students (aged 14 years old; all male) who were attending a school that is part of the national Eco school network (www.eco-schools.org.uk/), and taking a class on environmental education. We intentionally recruited participants with awareness of energy issues, as they would be better able to contribute to the design of a learning experience.

We engaged with the participants over 2 sessions one week apart. A *questionnaire* was given to participants before the first session. *Session 1* lasted about 1 hour and introduced the study and app. *Session 2* lasted about 2 hours and involved giving feedback on and re-designing the application to make it more engaging for teenagers to use. The teachers were present in both groups and contributed to prompting the discussion.

App functionality and design

The user can send and receive challenges. In response to a received challenge the user can create a pledge, and specify a date until which the pledge is active. Sent and received challenges, active and expired pledges can be shared with others. The design of the initial mobile application was based on previous research in Phase 1 of the EoR that led to an initial EoR model. The key findings that shaped the design were: a) Most participants did not think about their personal energy consumption, even though they were aware of energy issues at an abstract level. Therefore, we designed the app to prompt them to focus on *personal* energy consumption, b) There was lack of awareness around indirect energy consumption, and the relative energy used by different devices. We also identified the energy consumption that appeared to be the most relevant to teenagers. Therefore, the challenges are created based on a template that targets these specific issues, c) Participants mainly thought of their contribution to saving energy in terms of using less rather than finding alternatives or persuading others. We, therefore, prompted them to consider other options by embedding them in the challenges template, d) The Internet was listed as a main source of information on energy, even though participants appeared to lack the skills and background knowledge to search online for information on energy. We, therefore, added a placeholder for adding a hyperlink for additional information on the challenge.

Findings

We analysed the data in relation to: a) the participants' attitudes and knowledge about energy as expressed in the questionnaire, b) use of the application, and c) ideas on how to re-design the application, including feedback on the prototype app we gave the participants. Due to space limitations, we highlight some findings. As in our previous work, we found that teenagers are not particularly motivated to learn about their energy consumption, even though they report high concern about energy issues. In particular, we found that teenagers do not have a clear idea of how they might be affected. Regarding the use of the prototype application, findings are consistent with our previous work that suggests teenagers lack the skills to find information about energy, even though they are confident that there are sources available to them online. In terms of re-designing the phone application, participants insisted that it must be a game. This is not surprising, but it is interesting to examine their analysis of what elements a game would need to have to make it engaging. A promising idea to motivate teenagers to engage was that of their school benefitting through sponsorship from the effort they put into learning about energy. This also links to their comments about energy saving not being something that is visibly done by others. Connecting teenagers' effort to learn with effort from other people might provide an incentive for them to engage, and a more tangible and immediate result of their actions.

References

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