Stimulating a Dialogue on Renewable Energy Through Making

Abstract

We are exploring attitudes to renewable energy supply with the remote island community of Tiree. As part of this engagement, we are working with local children to introduce the topic of the energy generation potential of renewables (i.e. from wind and solar power). In this paper, we report on our early attempts to broker this engagement using a physical, co-constructed artefact (the PREP energy detector). Through making and co-construction, our goal was to encourage an ownership in the artefact, and thus foster enthusiasm for exploring energy potential. Observations from a recent workshop based on PREP suggest a high level of engagement and enthusiasm was engendered, which we believe was facilitated through co-construction of the artefact.

Author Keywords
Making; Sustainability; Community Engagement; Psychological Ownership

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

Introduction

As part of OnSupply, a project within the ongoing citizen-driven research initiative Catalyst [7], we are
exploring the perception of energy availability and supply on Tiree, an island located in the Scottish Inner Hebrides. We are conducting a series of workshops and studies mediated by technology prototypes to understand the perception of energy and to explore a possible future energy scenario where energy usage considers availability.

This paper describes the design of the Potential Renewable Energy Prospector (PREP) tool, an artefact intended to encourage an interest in the energy ecosystem of the island, and as a means to help the young members of the community perceive energy through its physicalisation. Crucial to the design of PREP was the need to engage young participants (aged 6–13), and encourage a sense interest through the ownership of the artefact.

PREP : Energy Detector
PREP is a deliberately playful artefact intended to provoke a dialogue about renewable energy. Inspired by previous citizen science style projects [2], PREP is an energy detector that allows the user to ‘take samples’ of available renewable energy; displaying the amount of wind or solar energy on a simple analogue gauge. Figure 1 shows the assembled PREP device.

The selection of a physical device as a metaphor to discuss available energy was motivated by two main factors. Firstly, the literature suggests that children within the age bracket of the workshop participants (6 to 13 years) require real, practical situations and activities as a way to gain understanding of abstract concepts and ideas [4]. Therefore, PREP has been designed as a prop to aid the participants in understanding the abstract concepts of renewable energy sources through the physicalisation of energy, and as a way to make the invisible, visible.

Secondly, throughout the workshop, the children were provided with an opportunity for enactive thinking, a processes where first hand experiences helps them to think and develop ideas [1]. PREP is designed as a kit that would be assembled by the workshop participants themselves, with more or less assistance from the project team, depending on their age and capabilities. Figure 2 shows an assembled PREP energy detector being used by one of the workshop participants. In total, 10 participants attended the workshop — during this time, 6 PREP tools were constructed, with the assembly and use of each being commonly shared between 2 participants.

Ownership as a design concern
The making of PREP also aimed to promote psychological ownership—that is, a level of personal investment in the artefacts themselves [5], which helps to sustain an interest in the project beyond the making activities; building on a sense of achievement and value embodied in the artefact brought about by the construction process [3]. One of our goals was also to leave the artefacts after the workshop to continue the engagement with the topic at a later interval.

Ownership of an object can affect the value perceived by its operator. For example, it is often the case that an item owned by someone else may feel less valuable than an identical item owned personally [3].

Practical design concerns
The development of the energy detector progressed through a series of relatively rapid and iterative prototype stages over the period of about three weeks. There were a number of practical and logistical concerns that influenced our design thinking. Firstly, the detectors needed to be cheap to produce and fast to construct. As a result, PREP is predominantly manufactured using rapid prototyping technologies (i.e. 3D printing), and readily
and cheaply available off-the-shelf kit components. We chose a plastic based substrate (rather than e.g. cardboard or paper prototypes) to enable the devices to be used outdoors on the island, which is famed for dynamic and variable weather, including strong winds and rain on occasion. The kits also had to be modular, and sufficiently simple to construct even by children as young as 6 years old, whilst also providing a challenge for pre-adolescents.

**Figure 2:** An assembled PREP tool being tested by a workshop participant (right); an exploded view of the kit showing the major components of the device (left).

**Reflections**

Overall, we feel that the workshop and the PREP tool were well received by the participants. Participants generally worked in teams of two, and were provided with any assistance when required, allowing them to complete the assembly within the allotted time. Despite the relatively challenging task of assembling the components, the participants showed no sign of frustration, and indeed stayed engaged throughout the entire workshop session—we suspect that this may be a result of a feeling of ownership towards the artefact imbued by the making activity. All instances of the PREP tool were constructed within the 1 hour 30 minute workshop.

The tool itself generated considerable excitement, especially as the children didn’t expect the session to involve making a tool. Several of the children tested their tool indoors and then ran outside to test their PREP devices. We could clearly hear enthusiastic exclamations of “It works!” punctuated with some loud discussion of the magnitude read on the devices’ gauges, whilst the children enthusiastically took readings.

After the workshop, the children were quite reluctant to part with their devices, and enquired whether they could take them home with them. The assembled PREP tools have since been left on the island in the care of the local youth organisation.

Since our visit, we have arranged to go back to conduct follow-up field-trips with the local school modelled on a ‘treasure hunt’ for energy, or *energy hunt*[^1]. The energy hunt will involve a visit to an historical or current power generating location (e.g. water mill, wind turbine etc.) on

[^1]: [http://cs-vyv.lancs.ac.uk/catalyst/energyisland/](http://cs-vyv.lancs.ac.uk/catalyst/energyisland/)
the island, with a talk being given by a local expert on the site. At each location, the children will also be given the opportunity to take wind and light measurements; it is the intention of the authors to aggregate and visualise this data, and present it back to the community on a subsequent visit. We hope to further explore attitudes to these devices and their design on these visits.

Concluding Remarks
To engage with the younger members of the Tiree community, we designed and constructed a playable artefact intended to encourage a dialogue on the supply of renewable energy on the island. Due to the cognitive, learning, and behavioural differences between pre-adolescents and adults, different ways to engage with each group are needed to maintain interest throughout the entire process. An example difference is that children and pre-adolescents are often characterised as having shorter attention spans [6]. As such, the planning of workshops for younger age groups should consider hands-on activities in order to sustain engagement.

In our workshop, this engagement is encouraged through the making (and the co-construction) of the artefact, which formed the basis of an effective and highly engaging workshop. The reaction to the artefact appeared to be positive, with a clear investment in the artefact being shown during its assembly and testing by the children. The hope is that this will lead to further dialogue and discussion around energy on future visits.

The authors intend to continue this engagement through a number of school visit days, where the children will get the chance to use the PREP tool to gather wind-speed and sunlight data and contribute to its live visualisation. This dialogue is part of a larger initiative to elicit ideas for digital interventions that may be used to help communities survive in an ever-changing energy ecosystem.

Acknowledgements
We would like to thank the islanders of Tiree for their hospitality and participation. In particular, we would like to thank the Tiree Development Trust, and Tiree Renewable Energy Limited for their patience, cooperation and support. We are also grateful for the funding provided by the EPSRC via Citizens Transforming Society: Tools for Change (CaTalyST), grant ref. #EP/I033017/1.

References