Facilitating Digital Participation through Design Projects with Economically-Marginalized Communities

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ABSTRACT

This position paper presents our experiences of Human-Computer Interaction (HCI) projects with economically-marginalised participants to demonstrate the role design research and artefacts can play in fostering digital skills for low-income people and their communities. We present two case studies with low-income participants of different demographics: one with women in crisis situations at a community care centre, and another with volunteers at e-waste recycling workshop. We illuminate the ways in which design activities such as self-reported experiences through video documentaries, and repurposing second-hand digital products, can facilitate digital and community participation for low-income people both in their homes, and in the broader community. In our discussion we reflect on the intersections of the two case studies: developing digital skills and enabling community participation through these digital skills, as well as the opportunities this has provided for participant engagement in the research process.

Author Keywords

Low-income; women; hacker spaces; self-reporting; digital participation.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Economic marginalisation is of increasing concern in Australian society, with a reported 13.9% of Australians living below the internationally accepted poverty line (ACOSS, 2014). Consequently, Australians from low-income backgrounds, including those who are experiencing unemployment, are at a higher risk of "digital exclusion", in particular due to technology affordability barriers (Thomas et al. 2016). Digital exclusion refers to those who do not have universal access to technologies or the digital skills to use devices such as computer or phones (Walton et al. 2013). As a result, some segments of the population are not able to fully benefit from access to information, online services, and social connections using technology (Thomas et al. 2016). Women in crisis situations are one demographic that experiences high levels of digital exclusion (Capel et al. 2016).

There is an emerging body of work in the HCI research communities that considers the role of design in facilitating digital inclusion amongst economically-marginalised communities, and the positive role technology can play in improving their lives (Vines et al., 2013). Consequently, there is much research around the importance of technology use in these low socio-economic groups (Dillahunt, 2014; Roberson et al., 2010; Woelfer et al., 2011; Woelfer et al., 2010). Studies around the use of technology within the homeless youth population found that technologies such as mobile phones were used for staying connected with others, and managing identity amongst friends and case workers (Le Dantec et al, 2008). These digital tools were also used in finding employment, creating videos to portray their lives on the street, and constructing online identities (Woelfer et al., 2011; Woelfer et al., 2010).

We present case studies of two projects that demonstrate the role that design research and artefacts can play in fostering digital skills, thus facilitating digital participation, for low-income participants and their communities.

Firstly, a self-reporting project with women in crisis situations, where participants were asked to capture certain experiences using a video camera and disposable camera. This builds on a small body of prior design work relating to marginalised women such as Clarke et al.'s photography project to support those who have experienced domestic violence to rebuild their lives and engage with the community through relationship building (Clarke et al. 2013).

Secondly, a contextual enquiry study of an e-waste recycling warehouse operated by volunteers from low-income backgrounds demonstrates the positive role of making and repairing technology in facilitating digital inclusion for both the volunteers and buyers of their design products. This project addresses an understudied intersection between hackerspaces and maker activities, and low-income populations, with prior work asserting that "the terms hacker and maker lacked representation for people of color and low-income residents, those unable to 'take advantage' of the maker movement" (Fox, Ulgado & Rosner 2015).

The development of digital skills were the outcome and object of the two case studies respectively, and taken together they illustrate the potential for these skills to benefit people of economically-marginalised backgrounds at both an individual level and through participation in the wider community.

CASE STUDIES

Self-Reporting of Women in Crisis Situations

Project Overview

This project involved the use of a self-reporting probe kit in a marginalised community of women who are living in crisis situations. Over the course of three months we deployed self-reporting probe kits with 13 women who relied on a community care centre for their weekly groceries. The participants came from diverse backgrounds and represented different age groups and crisis situations. Most were unemployed and all struggled with severe financial hardship.

The probe kit, as depicted in Figure 1, contained a disposable camera and video camera for one to two weeks to capture specific experiences of their lives.

Figure 1. The video camera, disposable camera and task cards that were part of the camera pack.

The participants were asked to use the video camera to record a short 10-15 minute film on how they live well on a low income. They were encouraged to share their experiences and stories, give advice to other women who may be in a similar situation, and show their favourite places to go. They were also free to capture anything else they wanted to share. The disposable camera included cards designed to prompt the participant to take certain photographs, for example: "these are three of my favourite technologies" and "this makes me smile". These were used as a means to encourage them to record their everyday experiences, as well as the things that were important to them. All of the participants completed the activity with the disposable camera and 11 of the 13 women completed the video camera activity. At the conclusion of the study, each participant was provided a $20 gift voucher for their participation.

The aim of this ongoing study has been to investigate the experiences of women in crisis situations and identify the role that technology could play in supporting and empowering them.

Digital Inclusion through Probe Kits

The use of the self-reporting probe kits allows for digital inclusion through interactions with the camera technology, which helped the participants to pick up new skills. For example, one participant (P11) mentioned that through interacting with the camera provided to her in the probe kit, she now felt confident in using her own digital camera. Figure 2 below is the photo she took of her camera to show the research team it was now one of her favourite technologies.

Figure 2. Photo of participant's own digital camera.

While employing this type of methodology within a digitally excluded group did come with certain challenges, we found an important part of this research was working with the women to assist them with learning how to use the camera technology. While many of the participants were able to take the camera away and use it independently after an initial introduction, there were a few instances where some participants struggled to use the cameras and required additional assistance. This meant one of the research team would work with the participant until they were comfortable enough to take the camera away again and continue to use it. While this was not our initial intention, we found it aided in building rapport with the participants who required additional help, and also ensured each of the women were comfortable with using the camera technology.

Capturing and Sharing Experiences through the Packs

The use of the probe kits also meant that the women were not passive participants in the research. Self-reporting their experiences through both the photos and the videos allowed the participants to share aspects of their lives that they may not have felt comfortable to share with the research team otherwise. These included favourite possessions, their housing situation, problems they were facing and coping mechanisms they had in place. We found that many of the participants involved themselves in our study in order to help other women who may be in a similar situation. Through the photos and videos, women shared advice and good practices they wanted to convey to other women. For example, P3 emphasised the importance of investing in quality furniture and whitegoods upfront to save money on replacing items in the future, and wanted other women to know of the no-interest loans that were available for them to be able to do so.

E-Waste Maker Facility for a Low-Income Community

Project Overview

This project involved contextual enquiry of an e-waste recycling organisation named Substation 33 that engages volunteers from economically-marginalised backgrounds to disassemble, repair, and refurbish technology products. The organisation comprises a small number of paid staff and a large volunteer base who typically receive

government benefits either through allowances (e.g. youth allowance, pension, disability support) or the work-for-the-dole program. The organisation receives donations of electronic waste (e-waste) including old computers and peripheral equipment, televisions, phones and printers from business and individuals in the region (Figure 3). Once the e-waste products have been received and checked in, volunteers check to see whether the item can be easily repaired, and if not then it is disassembled into components. The IT products are repaired or refurbished by the 'IT Team' and sold on to customers who live locally in person or by e-bay, and are shipped to lower OECD countries. Recovered batteries and other components are used to build 3D printers that are provided to local schools, and to create new battery packs for existing products such as cordless drills.

Figure 3. A container of mixed e-waste products ready to be sorted and inspected.

The aim of this ongoing study has been to investigate the social benefits of making and repairing for people of economically-marginalised backgrounds, and identify resulting design implications in this space. The researchers have conducted face-to-face interviews and participant observation sessions with 10 volunteers so, addressing themes including making and hacking activities, identity and wellbeing, and peer-learning through socialisation. Studying technology use has required the use of technology by researchers including voice recorders to capture the interviews, and digital cameras to take photos and videos of the participants' maker activities during the observations sessions. Through an ethnographically-inspired approach, the researchers have taken an active role in community activities including disassembling e-waste products alongside volunteers and participating in the weekly workshop barbecue lunch.

Digital Skills Development of the Volunteers

The e-waste recycling activities have facilitated digital skills development in the volunteers, enabling them to meaningfully participate in the work of the organisation, while developing transferrable skills for home projects and future employment. For one volunteer (P4), conducting checks on incoming equipment has provided them with technical knowledge about the item, skills in troubleshooting problems, and the judgement to "set the standard" in terms of what items are of "acceptable quality" to for repairing and refurbishing. For another volunteer (P6), e-waste recycling is equipping them with both specific technical skills such as working with servers and remote installation of software, as well as general competencies including organisation, teamwork, and communication. These digital skills are allowing volunteers to pursue their respective career aspirations, particularly in the IT domain.

For another volunteer (P7), e-waste recycling is providing them with the equipment and knowledge to participate in maker projects at home and in the broader community. After more than four months of regular volunteering with the organisation, the participant has developed the skills to discern what tools are needed for disassembling a particular item, and where they are located in the warehouse. This hands-on experience with disassembling and making (Figure 4) is providing a resource to build their own guitar amplifier and pedals outside of volunteering hours. Moreover, the ability for volunteers to buy e-waste components from the organisation at affordable prices means that they can participate in maker electronics projects as a leisure activity.

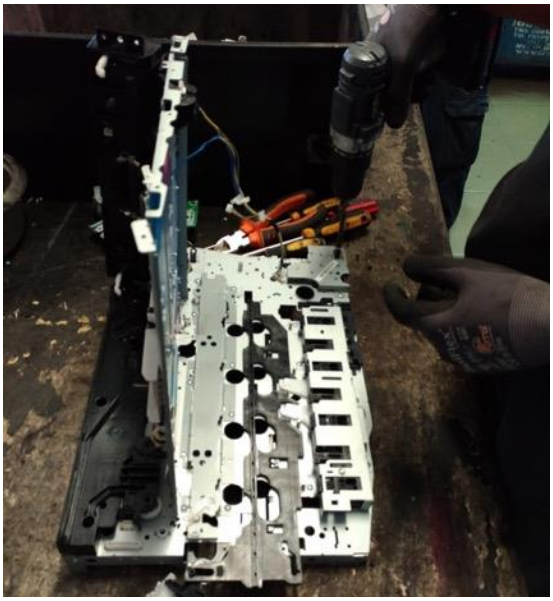

Figure 4. An electronic waste item being disassembled.

Digital Access for Marginalized Customers

Once repaired and refurbished, the organisation sells preloved technology including computers and smartphones to local community members either in-person or through online e-bay sales. The recycling facility is located in a geographic area of "great socio-economic disadvantage" including low levels of educational attainment and high levels of unemployment (Vozoff, Murphy & Manning 2010). When asked about the impact of the organisation on the community, several volunteers firstly identified that providing digital access for marginalised customers is an important aspect of the organisation's work. Environmental impacts or opportunities for volunteers were discussed as secondary concerns.

For example, one volunteer (P8) stated that the organisation has a "pretty big impact" in terms of

supporting economically-marginalised customers to "stay in touch with technology". The fact that the organisation sells refurbished electronics at such a low cost means that it is more affordable for customers than buying tech products new from other shops, particularly those who rely on government benefits as their main source of income. Another participant (P11) explained the benefits of digital access for school students who are able to afford computers from home that are similar to the ones they use in school, and for jobseekers at a time when many recruitment processes are carried out over email. While some technology items may seem "old" to the recyclers, it still has the potential to be "new" and exciting to customers who may not have experienced these items before.

These examples illustrate the wide-reaching opportunities for technology to facilitate digital inclusion of the initial owners of IT products, for the volunteers involved in their recycling as an e-waste item, and for customers in the community who eventually purchase the refurbished electronics from the e-waste organisation.

DISCUSSION AND CONCLUSION

While the participant demographics and context are different, these projects both demonstrate the ability for technology to support digital skills development and facilitate digital participation for economically-marginalised communities in numerous ways. The following points serve to bring these case studies together around the theme of *fostering digital skills at home and in the community*.

Firstly, participants from economically-marginalised backgrounds in both studies have developed digital skills such as the use of digital cameras to film personal documentaries, or repairing and refurbishing computers that are transferrable to other areas of their lives. This has either been facilitated through the research in the case of self-documentary making with women in crisis, or has been the object of study itself for the contextual enquiry of the e-waste recycling organisation. As mentioned in the case studies, participants have gained greater confidence in using their own cameras from filming the self-documentaries, and have gained knowledge and equipment through the makerspace that can support home hobby projects.

Secondly, both studies illustrate the ways in which fostering digital skills in individuals from economically-marginalised backgrounds has created opportunities for community participation. For the self-reporting study, women in crisis have been provided with a new digital avenue to share their stories with other women in similar situations. For the e-waste recycling organisation, community participation is twofold. On the one hand, volunteers are developing the digital skills to meaningfully contribute to the organisation's different projects. On the other hand, customers from the local area are benefiting from greater access to low-cost technology products and the opportunities this provides in terms of education, communication, and access to essential services. The technical and people skills that volunteers have gained at Substation 33 has enabled many of them to successfully transition into paid employment, either with Substation 33 or external companies such as IT firms. Some have chosen to continue volunteering with Substation 33 in addition to paid employment given their enjoyment of e-waste recycling activities and being part of that community.

Thirdly, the process of discussing and sharing digital skills has enabled researchers to strengthen relationships with participants in both cases. For the self-reporting study, learning how to use the camera and providing assistance with filming the documentaries has created new opportunities for collaboration and interaction between the researcher and participants on a personal level. During the volunteer interviews for the e-waste recycling organisation study, talking about the technical and soft skills that volunteers have gained has been a key theme in each participant's story and a ripe topic for conversation. 'Hacking' alongside volunteers during informal discussions and the participant observation sessions has also strengthened the researchers' familiarity with the organisation and its people, reminiscent of the Geertzian notion of "deep hanging out" from anthropology (Geertz 1998).

In this paper, we have contributed two different HCI case studies illustrating the positive role that design research and artefacts can play in facilitating the digital participation of economically-marginalized people. Through our participation in the workshop, we hope to further the discussion about the future potential for design projects to address the "digital divide" by reaching out to subaltern community members.

ACKNOWLEDGMENTS

Thank you to our participants, and to the reviewers for their feedback.

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