Walking Blind: Developing Awareness of Visual Impairment to Support Empathic Design Research Strategies

Deana McDonagh* Joyce Thomas**

** University of Illinois Urbana-Champaign*
Champaign, IL USA, mcdonagh@illinois.edu
*** University of Illinois Urbana-Champaign*
Champaign, IL USA, jkthomas@illinois.edu

Abstract: Empathic design strategies focus on engaging with the user on more intimate levels to ensure that appropriate and intuitive products are developed. Empathy needs developing and nurturing, and may not come easy to all designers. Taking students outside their comfort zone can be an uncomfortable, disconcerting, and unfamiliar experience. Current design students are less likely than any previous generation of designers to be designing for people just like themselves. With the increase in life expectancy, disability no longer being a barrier to quality of life and a shift towards personal responsible health maintenance, this current generation of designers is likely to be designing for older users with multiple disabilities.

The authors took themselves outside their own comfort zones to experience visual impairment in order to appreciate how design students may respond when they experience a range of visual impairments. Three approaches to empathic modeling are explored; (i) unsupervised walking with cane; (ii) trained and supervised walking with a cane; and (iii) the students conducting empathic modeling. As we prepare our future designers for their careers, we need to equip them with appropriate skill sets, so that they can respond to the dynamic and evolving experiences of the user.

Key words: empathic design, industrial design, visual impairment.

1. Introduction

Worldwide population demographics are shifting. People are living longer and expecting a higher quality of life than ever before. Over a typical life course people develop a range of disabilities (e.g. arthritis; diabetes; hearing, vision, and dexterity loss). Disability should not be a barrier in the pursuit of a high quality of life. User expectation of products is growing which suggests a balanced approach to functionality is more important than ever. Rather than designing for the users, we need to be designing more intimately with them. Empathic design research is a strategy that relies on the end-user being an active partner throughout the designing process.

Industrial Design (ID) practitioners are innovative problem solvers, serving as the advocate and voice of the user (whose background, physical abilities, and education may differ greatly from their own) in the product development process. They ensure more appropriate design outcomes by engaging and studying people in their personal environments to gain a deeper understanding of user behaviors and perceptions towards products. Typically, designers are people without severe physical disabilities. They use innovative ways of thinking to

solve problems of how people react to products in their material landscape (i.e., the products that people surround themselves with and that fill their personal and public environments).

The user experience of people with disabilities is often significantly different from people without disabilities. They face challenges in the material landscape that those without disabilities may not even be aware of or take for granted without question – e.g. people without disabilities have an expectation that they will be able to enter, exit and move around an unfamiliar venue easily, whereas a wheelchair user may not have the same assumption. The conditions that provide the starting point for people with disabilities re-imagining the material landscape may or may not be radically different from their counterparts without disabilities. In particular, people with disabilities face barriers in accessing the materials, skills, and facilities in educational settings and professionals studios where industrial designers learn and work.

The concepts of empathy, empathic horizon (the boundaries of a designer's knowledge and understanding), and the material landscape are illustrated through this discussion of a design research project. Using empathic design research approaches, students with disabilities and Industrial Design students worked together designing everyday products. These empathic methods utilized the resourceful user group of students with disabilities, whose voice is relatively unheard in the designing process. The empathic approach used highlights research strategies that support more effective design outcomes.

As design educators, we encourage the adoption and adaption of more empathic design research strategies for student designers. Unlike many other professions, industrial designers tend to go straight into professional practice following their undergraduate degree experience. As a result, they may immediately be involved with product development of mainstream products that are on the market within 6 - 12 months of their graduation from university. It is important to prepare students for rapid immersion the professional product development process.

The Walking Blind research project focused on developing more immersive empathic modeling experiments that could be easily adopted and adapted for design students and professional practitioners. The first stage was for the authors to evaluate the protocol of the experiment themselves in order to assess the level of risk to the individual (the student), monitor the length of time it took to complete a task, and assess whether the activity would enhance the student experience and lead to more in-depth understanding of others with visual impairments. This project recognizes the 'normality' of doing things differently [1] as inspiration for new product development. Rather than the user having to accommodate the product, future products need to accommodate users who do things differently than each other.

2. Background: Empathic Design

Empathy is "our intuitive ability to identify with other people's thoughts and feelings – their motivations, emotional and mental models, values, priorities, preferences, and inner conflicts"[2]. Empathic Design is a strategy for developing products and environments that benefit of the wider user population by applying insight and awareness of life-expert-users. Current design theory, practice, and education stresses Universal design principles that imply that the design is "usable by all people to the greatest extent possible, without the need for adaptation or specialized design" [3]. These principles strive to create more all encompassing user-friendly products and spaces. However, if a product or technology is developed without fully understanding the user,

barriers can develop when the product does not resonate with the target user and product abandonment becomes highly probable. For example, if an individual has had hip replacement surgery and they are given an assistive cane or walker that does not 'reflect' how they see themselves they may be less likely to use these products, which can hinder their healing process.

Effective designers cannot rely solely on their own experiences and capital (e.g., background, physical abilities, and education) as they develop interfaces with objects and spaces for the wider population. Their ability to create outcomes that are enabling to people of all levels of ability is enhanced through gaining empathy with the user who is an expert-user within their own material landscape. While scientific research relies on objectivity, empathic design research builds on the synergy of individuals developing relationships and embracing subjectivity for its positive values while recognizing its limitations. Both the designer and user are dynamic elements in the researching process. Unlike traditional scientific researchers, designers need to transform these types of data into information that is applied to generate more appropriate design concepts. This approach emphasizes a shift in thinking within the designer in order for empathy and deep understanding to develop. It requires the designer to acknowledge and expand their "empathic horizon" [4][5][6] – boundaries of understanding and knowledge - which can take the designer outside his or her own comfort zone. This empathic horizon is naturally connected to the life course of an individual. From childhood to young adult and finally into adulthood individuals broaden their social networks giving them an increased understanding of other people and situations that helps them become more socially and culturally aware and integrated. Exposure to social situations supports opportunities for individuals to develop skills related to communication and interaction.

The empathic design strategy not only introduces design students to user-experts [7] it reinforces the fact that users are central to designing and to developing meaningful design outcomes. Expanding their personal horizon to include a breadth of users with various needs/wants/desires takes the designer outside their personal comfort zone and allows them to be flexible in understanding cultural cues in the user context that informs design outcomes. Empathic design research deepens the designer's understanding of users different to themselves in the designing process and builds on the synergy of individuals developing relationships [8]. This is the essence of qualitative design research [2]. Industrial designers combine this qualitative research with more traditional objective research data (e.g., market research, socio-economic and anthropometric) to ensure more relevant design outcomes.

3. Disability + Relevant Design

The authors have developed a course entitled "Disability + Relevant Design" (D+RD) which brings students with and without disabilities who are Industrial Design majors and students from other colleges together in the same learning space. The students are taught empathic research strategies that consider user needs to support wellness and well-being and the creation of more empowering products and spaces. Two research activities were conducted and qualitative feedback was elicited from the students in the form of quick writes.

3.1. Experiment: Blindly Walking, becoming more spatially aware

Empathic design research focuses on the designer gaining more intimate knowledge, awareness and understanding of the target user. The goal of this exercise was to develop relevant and appropriate "empathic design research" experiments for Industrial Design students in the D+RD course. The specific "out-of-comfort

zone" activity planned was to place two students together as a team. One would be "blind" (using a blindfold and a walking cane) and the other would be the navigator and photographer. These teams would navigate their way from the classroom building, outdoors and across the campus to a store about a half mile away where they would stop for ice cream or coffee to simulate the urban environment (e.g. vehicles, pedestrians and cyclists). The students would then trade places and return to the classroom. The students would be allowed to use the local bus transit system to travel the distance. It was anticipated that the students could complete this exercise in approximately 45 minutes.

One method of development in ID is to initially approach a problem in a naïve way – that is without so much research or background that tells us the design solution cannot be done. This practice often contributes to innovative solutions – experiments and unexpected results causing the designer to travel the path in a new way. But they had to consider if this approach was appropriate for this particular exercise. To evaluate the protocol, they tried this exercise first on our own without any guidance as to how to use a walking cane to better our own understanding of the experience. They quickly discovered that this exercise was not logistically possible for the students to complete as originally conceived.

What would you do if you woke tomorrow and found you were blind? The authors were about to find out. Once the blindfold was in place, walking down the corridor of a building that they had walked hundreds of times before became a new experience. The corridor has many indentions at office doorways and sofas and chairs line shallow alcoves. The blindfolded author negotiated the environment using her mental spatial map but had not anticipated things that normally went unnoticed - floor mats in the hallway and gaps between two floor sections.

Venturing outdoors and down wooden (accessible) ramp at the back of the building, she reached up to find the railing along the ramp – and followed the length of the cane with her free hand to find the rail with her hand. As she passed from shade to sunlight, the temperature change of the railing was very apparent. Leaving the ramp behind, they walked down a path around a garden at the back of the building to another entrance. She had a developed a spatial map of these surroundings relatively quickly. Then they switched places and it was the second author's turn.

Walking next to the garden, (author two) kept tapping at the edge of the sidewalk to keep close to one edge as a guide for walking straight. Immediately she noticed a heightened sense of smell. There were evergreen bushes close to the edge the path. Only moments before walking past them fully-sighted, the author had not noticed the scent. The pathway felt different than what was remembered in the mental spatial map which made author two uncertain and a bit disoriented. The building's air conditioner became could be heard to the left but did not really help the author spatial orientation. Someone walked past going the opposite direction and another person on bicycle rode past in the same direction. The "blind" person heard their approach, but had not identified what was happening until they were already past.

This empathic exercise had taken an hour and they had traveled only a distance of perhaps 200 yards and back and left both of us feeling exhausted. So what did they learn? How was this exercise beneficial as an empathic experience? With the loss of the visual cues, they both relied on our mental spatial maps of the building. It was scary, disconcerting and disorienting, but not frightening. There was safety in the familiarity of the building and reliance upon a friend. Our other senses seemed to immediately amplify to compensate for the loss of vision.

Figure 1: (a) (b) and (c): Walking Blind

Figure 1 illustrates two significant moments during the experiment. The first photograph (1a) illustrates one of the authors walking from the interior towards the outside doors. Within only a couple of minutes, it became evident that her sense of hearing had become more 'amplified' almost as if all her body had begun to immediately compensate for the lack of vision. This image represents how completely alone the author felt during this moment in time, on her own navigating the public space. The second photograph (1b) actually provides a much more comprehensive view of the space and the actual situation. She was surrounded by students and colleagues, but she was not aware of them being so close to her. In the 1c image one of the authors is experiencing unexpected barriers that were above ground level, though her focus was initially on the ground.

The Walking Blind experiment certainly took the authors outside their comfort zones, and helped to sensitize them, however briefly, to life with visual impairment. In addition, it sensitized them to an empathic modeling activity they were planning for the students. Sound, touch, and smell became the means by which one was able to navigate through the environment. The authors will continue to explore sensorial impairment as one of the multiple research approaches to help support understanding within the product development of everyday objects. This rapid immersion was an appropriate method for the two of us, but not for a class of 24 students within the constraints of a class period. They recognized that they needed to be trained to use a walking cane and that they should consider redesigning the student exercise.

3.2. Supervised and trained in walking with a cane

Looking at the world through empathic experiences allows one to be a more reflective and sensitive designer. Following on from the informal 'immersive' approach taken by the authors at experiencing visual impairment by impairing their vision in their own working environment, they received structured training in the use of the walking cane at the Dallas Lighthouse for the Blind in Texas[1]. Nancy Perkins is the President of this organization, and is a recognized industrial designer. Her experience at the Dallas Lighthouse, working with employees with visual impairment, has changed her perception of what are well designed products and led her to only consider products (designs) that are *low vision* solutions.

The main differences between the earlier study and this experience is that the authors received tuition in alternative ways of holding the cane, the different canes available, technique for walking in a straight line, the

[1] www.dallaslighthouse.org

importance of sound as a navigator aid, audio signals and cues. In addition, unfamiliar interior and exterior environments were experienced under one-to-one supervision.

Starting indoors in a quiet environment, they were taught to center themselves spatially with a known object and to hold and move the cane in ways that would provide them with "visual" data of the space (refer to Figure 2). They learned safe techniques for finding and moving through doorways and negotiating stairs. They again noted the key role sound plays in spatial awareness when vision is impaired as the indoor lobby space echoed, providing feedback to help the author locate the door. Moving outdoors into a courtyard, the blindfolded author moved tentatively, wanting to put her free hand out to help locate herself in relation to structural objects as she learned to trust the cane and the tutor. The sounds of a slight breeze and a water fountain in the courtyard provided visual cues to her mind's eye. A group of blind people passed by her, walking unassisted with their own canes as they exited the building at the end of their day's work.

Figure 2: The authors being trained to use the walking cane (at the Dallas Lighthouse for the Blind in Texas)

An experienced trainer will generally work with a visually impaired person in an indoor setting for several sessions before heading into an outdoor environment. With a sense of boldness inspired by their expert trainer and the restriction of a limited time constraint, they left the building, heading out onto the sidewalk of a main thoroughfare for the other author to experiment. Trusting the voice of the trainer who was walking backwards in front of her, the second author stretched her comfort zone and tried to walk at what seemed to be a brisk pace. When they reached a cross street, it seemed as though they had covered several blocks, but in reality had only traversed perhaps a hundred yards. The sidewalk was extremely uneven, broken in places, and included several metal grates. The traffic was heavy and seemed close. Without the presence of the instructor as a guide, the sounds of the traffic would have been overwhelming and frightening. The author could see the ground surfaces through her feet. Only afterward could she tie in the sensorial and the visual. It was easy to walk past these experiences without noticing them (refer to Figure 3).

Figure 3: Unobserved ground surfaces

The empathic experience went beyond the actual modeling activity as the authors reflected on the experience with the trainer. They realized that walking with a cane not only required significant skill, but pace and confidence.

3.3. Empathic Modeling: student activities

Two distinctive activities were designed for the student group (a) individual activity to be carried out in their own home environments, in private and (b) individual activity to be carried out in the classroom environment.

3.3.1. Everyday Task

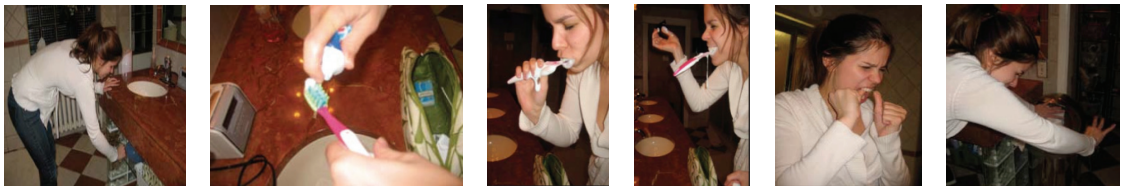

Figure 4: Student cleaning her teeth without any vision.

The first activity required each student to choose and record a personal everyday *ordinary* act. Requiring the students to record the activity photographically into storyboards gave them a means by which they could visually present their experience to the student group. Students simulated a range of disabilities (e.g. visual impairment, lack of mobility in hands and/or feet). Figure 4 illustrates one student's experience. Sharing their approach, rationale, chosen task and personal experience begins to help them develop a shared language to communicate and express relatively complex emotions. Overall the students expressed how time consuming these everyday tasks were for them to perform with a physical disability. This activity was intended to prepare them for the next empathic activities.

3.3.2. Simulating Retinitis Pigmentosa

The second activity required them all to produce goggles or customized glasses that restricted their vision by removing their peripheral vision in order to simulate Retinitis Pigmentosa (RP). One of the students in the class is legally blind with RP and has a seeing (guide) dog. She spoke to the class to explain what life is like for her living with this degenerative visual disability. However, it was only when the students attempted the relatively straightforward task of walking to the local coffee shop to order a drink for themselves and then return to the classroom, did her experience resonate with them. This task took approximately 30 minutes, but the students were required to keep their goggles/glasses on for a further hour until the end of the class time to extend their experience (refer to Figures 5, 6, and 7).

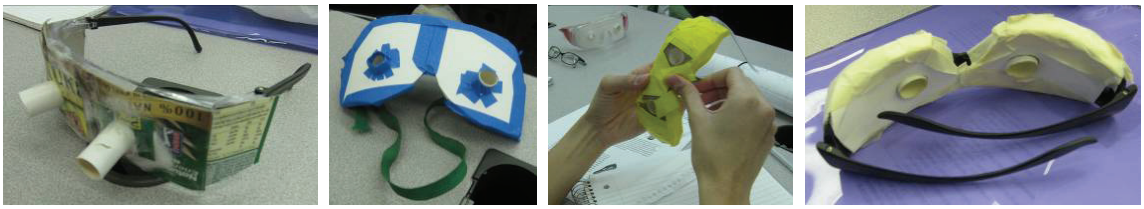

Figure 5: Students prepared goggles and customized glasses to restrict peripheral vision

After the activity the students shared their immediate thoughts, comments, and feelings through quick writes. Overall the experience was positive and immediately sensitized the group to the daily struggles others may experience.

Comments on being part of this activity from the student with visual impairment:

> *This experience was really **enlightening** in that I found many people asking questions about how I function on a day-to-day basis, how long my vision has been this way and so on. I hope that this experience will help the **students gain understanding of a different life experience**.*

So that she had the opportunity to reflect on the experience, they elicited her feelings and comments about the activity one week later:

> *It was thrilling to observe the reactions of the students when they encountered what I live with each day. I felt that by experiencing what someone goes through on a daily basis the students can help **change incorrect perceptions** of people with disabilities and promote understanding.*

This exercise made the students stand out among the other coffee shop patrons, but as they were in a group, there was a safety in numbers. It was acknowledged by many members of the class that if they were to attempt this activity on their own in a restaurant or coffee shop, they may feel even less comfortable.

Figure 6: Students conducting an empathic modeling activity within the public environment of a coffee shop

One unexpected outcome from this activity was how another student who has a hearing difficulty responded. She became extremely distressed. Living with deafness is an everyday challenge for her, but to have her vision impaired (even temporarily) was overwhelming for her. The sounds in the coffee shop were undefined and distressing noises to her. She separated herself from the group in order to try to find a quiet place. With some difficulty and determination, she completed the task as planned. The teachers elicited her thoughts immediately afterwards:

> *I get extremely **anxious and panicky** around a lot of people all the time, so when I cannot see them to move to an open space I freak. This mixed with **not being able to hear** much became **overwhelming**. I realized how much I rely on **visual cues** from people to be able to understand them.*

One week later they again elicited this student's feelings and comments about the activity, so that she had the opportunity to reflect on the experience. This feedback was significantly more objective and less emotional:

> *Simulating retinitis pigmentosa combined with my hearing impairment resulted in a **strong emotional reaction** I had not expected. It made me feel very anxious due to the lack of senses especially since I have claustrophobia around people. I felt that since I could not see them I could*

not get away from them, so I mostly stayed in a comfortable corner until someone came to my rescue.

Figure 7: Disability + Relevant Design course simulating Retinitis Pigmentosa

Student feedback from the Disability Goggles experience:

> *The purpose of it was most likely to examine the successes and failures of product designs, but I think we also succeeded in getting to look out things from* ***other people's perspectives****.*
>
> *Immediately,* ***I felt lonely****. For some reason losing my peripheral vision, left me feeling like everyone left too.*
>
> *I felt that my* ***hearing was amplified****.*
>
> *Despite the fact that I was able to still see a fraction of the room I now realize how* ***dependant one must be on sounds, walls, light, and people*** *to guide them around. I believe that through this many can* ***obtain a greater insight*** *into this obstacle that many face their lives.*
>
> *This experience made me feel extremely insecure. I was* ***depressed and mad*** *at the same time, because I felt like I cannot do things right. I was worried because I did not want to knock things over.*
>
> *I found myself* ***listening to the surroundings*** *more, and* ***identifying people more by their voices*** *than their appearances.*

Overall the students in the course enjoyed the experience and felt that they now had a greater understanding for living with visual impairment. This activity helped to bridge the experience they had *read* about with the experience that they had *felt*.

4. Discussion

A disability specialist raises concern over negative stereotyping of how we perceive people who do things differently:

> *...we want to be careful and mindful of how we present and execute simulated activities ... as they sometimes can backfire and perpetuate stereotypes rather than diminish them, even with good intentions.* [Heft Sears, personal communication]

As the D+RD course was developed, the focus was on individuals who have different skills and may do things differently in a positive way to support innovation. These research activities have focused on taking the students (and the instructors) outside their personal comfort zones in order to expand their empathic horizon. As future designers, these students will more than likely be designing for people unlike themselves and so being able to gain insight, awareness, and empathy with others it a vital skill.

Products that fill our environments (material landscape) have a significant impact on our daily lives. These artifacts not only assist us with particular tasks, but they satisfy our needs beyond the functional. As consumers of products we may not always be consciously aware of the supra-functional needs (e.g. emotional, cultural, and aspirational) that drive our purchasing decisions. As we review and evaluate the products with which we fill our environments, it becomes evident that these artifacts help us communicate who we are and often who we would like to be [9]. The ideal user does not exist. Users are unique, with varied abilities and different skills. Designers cannot assume that all users will be able bodied. Developing empathic techniques and strategies that support more thoughtfully designed and meaningful products will certainly enhance the user's material landscape.

Integrating empathic design research activities into an educational course has both benefits and drawbacks. It takes significant time and effort in planning these activities. One cannot always predict how the students will respond. Taking the students outside their comfort zones can be met with some resistance to begin with until they are reassured of the relevance of the activity. With any classroom of students, instructors need to be mindful of the varying abilities of the individuals that make up the group.

The visibility of these activities have impact on people beyond the confines of the classroom or the course. The activity that involved goggles/glasses that simulate RP had an impact on the coffee shop employees who had heard about the activity and were looking forward to witnessing it. One student raised concerns that the University was using the course as a vehicle for public relations. Though this was not the case, the instructors need to be mindful of how the course is perceived, not only by its current cohort but also for potential future students.

Figure 7: Designerly doors that are visually attractive but a major challenge for anyone with visual impairment.

As designers, we tend to advocate the clean style approach to products - clean edges, truth to materials, and minimal decoration. This design ideal works well when all products are being developed on paper, in model form and then three-dimensionally on the computer. However, when you begin to consider real people, with real needs and real dis/abilities, the design ideal can become quite different. Figure 7 illustrates a designerly glass door that is the entry way to an art museum found within the locality of the course. This was one of the doorways that the students conducting the RP exercise had to negotiate before they accessed the coffee shop. As with the majority of door furniture (e.g. handles, knobs, keyholes), the design language is not clear. How often have you gone to push a door, based on the visual language being communicated by the door, to find that you actually need to pull it to open? Though this disconnection between the visual product language and the user experience can be irritating and sometimes embarrassing, for someone with visual impairment this irritation can become a significant barrier to them. The design students who had previously considered these to be well-designed doors now voiced their concerns about how difficult the glass doors were to see.

5. Conclusions

Empathic research strategies are about going beyond traditional design research, where the researcher is objective and distant from the subject. This approach engages the designer (researcher) and user (subject) as collaborators, who together develop knowledge and understanding in order to generate appropriate solutions for real needs. This course is not about designing specifically for people with disabilities, but rather about learning there are different ways of completing tasks to inspire more intuitive products.

The activities described within this paper highlight approaches that can support experiential learning both for the student and the instructor. Through this experience, it has become clear that the authors learned from the process and from the students themselves. The authors have observed that these activities have encouraged the students to develop their other design products while engaging with *real* users and to identify *real* needs which will lead to *real* solutions.

6. Acknowledgements

The authors would like to express their thanks to the University of Illinois Urbana-Champaign and the Campus Research Board who sponsored the research presented in this paper. Special thanks are given to Nancy Perkins (Dallas Lighthouse for the Blind), Lydia Khuri, (University Housing), Susann Heft Sears (DRES) and LaWanda Cook, PhD Candidate (Graduate Assistant) for their critical assistance and encouragement during this project.

7. References

[1] Hansen N & Philo C (2007). The Normality of Doing Things Differently: Bodies, Spaces and Disability Geography. *Tijdschrift voor Economische en Sociale Geografie*, 98 (4): 493-506.

[2] Fulton Suri, J. (2003). Empathic Design: Informed and Inspired by Other People's Experience. In Koskinen, I., Battarbee, K. & Mattelmäki, T. (Eds.), Empathic Design: User Experience in Product Design. Finland: IT Press, p 52.

[3] Roberts, R. (2009). Universally loved: Universal access allows children of all abilities to have fun. Parks & Recreation, 44 (12), 43-45.

[4] Denton, H. & McDonagh, D. (2003). Using focus group methods to improve students' design project research in schools: drawing parallels from action research at undergraduate level. International Journal of Technology and Design Education, 13(2), 129-144.

[5] Laurel, B. (2003). Design research: methods and perspectives. MIT Press, Cambridge, MA.

[6] McDonagh, D. (2008). Do it until it hurts!: empathic design research. Design Principles and Practices: An International Journal, 2 (3), 103-110.

[7] Ostroff, E. (1997). Mining Our Natural Resources: The User as Expert. Innovation, vol 16, no 1.

[8] Khuri, M. L. (2004). Working with emotion in educational intergroup dialogue. International Journal of Intercultural Relations, 28, 595-612.

[9] Walker, S. (2006). Sustainable by design: explorations in theory and practice. London: Earthscan.