Older Adult Insights for Age Friendly Environments, Products and Service Systems

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Abstract

The environments we grow old in present a challenge to be adaptive to our changing needs and limitations. Environments, in the context of this paper, are the spaces, products and product service systems that we engage with, alone or with others, within and outside the home. A design coalition (Manzini, 2015) was generated between a number of academic Institutions and ISAX (Ireland Smart Ageing Exchange) an 'ageing think tank' organisation in Ireland. The intention of this coalition was to generate awareness of needs requirements for age friendly environments and to provide an example of how participatory design research can inform innovation in business and policy development at a local and state level.

A five-week study was conducted using design and ethnographic methods with twenty-two older adult participants (age range 69 – 80). The themes of study were identified as: mobility, public spaces, safety, social engagement, services & facilities. Cultural probes, semi-structured interviews and user observation, by both researchers and older adult participants, were used as methods to identify the unmet needs of participants within the sample group.

A Co-Design Symposium (http://info.isax.ie/national-co-design-symposium) was held during June 2016 as an opportunity to demonstrate to a wider stakeholder audience the needs identified from this study. This Symposium was attended by over 100 people of various backgrounds (town planners, architects, transport experts, retailers, builders, health and other service providers). The older adult participants and designers (staff and researchers from the School of Design at the University of Limerick, IT Carlow, Limerick Institute of Technology and Limerick School of Art & Design) were placed within teams of ten. The research was presented using audio/visual

presentation as well as artefacts from the fieldwork, completed diaries, scrapbooks, storyboards etc. Solutions were worked on, and delivered at the end of the day. This Symposium has impacted positively whereby policy makers in local government have invited ISAX to further discuss research outcomes and the needs of older adults as a means to develop access areas in and around Limerick City. This paper outlines in further detail the design research methods used, and the benefits through design education Student/ Researcher /Stakeholder collaboration by application 'in the 'field' and displays the effectiveness of design coalitions in influencing and affecting change and insight into policy. It highlights how co-design collaborations can impact and generate design solutions that improve day to day experiences.

1: Introduction

There are a number of age specific agencies focusing on the needs identification and mobilization of the older adults' voice as a means to influence and deliver product and service systems that benefit all. One such agency is ISAX (the Ireland Smart Ageing Exchange). As a result of a rapidly growing ageing population and an increase in longevity, everyone who lives long enough will experience a disability, or a gradual decline in physical, sensory or mental abilities (Morris, Mueller & Jones, 2010). The ageing population is a design concern that requires ensuring that design in industry, and higher-level design education, generate awareness by engaging with older adults using participatory or co-design methods. As design becomes more embedded in society new practices are emerging (Broadbent & Cross, 2003). Emerging design practices, centre around people's needs or societal needs, and require a different approach in that they need to take longer views and address larger scopes of inquiry (Sanders and Stappers, 2008). To elicit their user knowledge and to better understand the context of user experience, the active participation of potential users in the early stages of design process has gained importance (Sleeswijk Visser, 2009, Turhan & Doğan, 2017).

A collaborative coalition of academic institutions, (University of Limerick, Institute of Technology Carlow & Limerick School of Art and Design, Limerick Institute of Technology) came together with ISAX; with the intention to organize a co-design symposium to exemplify how this activity can affect change and influence policy. Research through design (Frayling, 1993) is an activity that diaries and documents the paths to understanding and defining needs requirements. There is a move from designing for people to designing with people (Sanders & Stappers, 2014). Designers as part of a team are responsible for carrying out research, analysis, and interpretation of data and creating solutions with the stakeholders involved in any given context (Bate & Robert, 2007). Designers can also use the ideas generated by others as sources of inspiration and innovation. Co-design as described by Manzini as a "*social conversation*" was deemed a suitable approach on which to build the collaborations required for the Symposium. Co-design in various forms, from participatory design to co-creation, is growing rapidly. Co-design is not just about being responsive to stakeholders and listening to their needs; stakeholders actively contribute to the design of solutions (Bate & Robert, 2007). Designers and design researchers are exploring the creation of tools that

non-designers can use to create their own solutions. Therefore, a variety of stakeholders including older adults collaborated in a symposium to identify needs and develop solutions in a variety of areas. It was agreed that in order to build the structure of a symposium, themes would need to be identified that would offer insights to ageing, and day to day activities and tasks. A strategy to recruit participants, including an ethics approved plan for fieldwork, was devised. Older adult participants, students, researchers and staff from the School of Design, University of Limerick created a collaboration to work together and learn from each other and through each other. This activity, would deliver identified needs statements as the brief for each theme and work for the symposium.

2: Design education

In conducting design research there is also a growing emphasis on ethnographic and observational research. Observing people using products and services can lead to the discovery of unmet and unarticulated needs which can lead to a breakthrough in innovation (Cooper & Evans, 2006). Despite industry advances there is a belief that education is not supporting these opportunities and that design students are not well prepared with the skills for professional practice when they graduate (Kiernan & Ledwith, 2014, Sanders & Stappers, 2014). There are however some moves to include design research methods including generative and participatory design methods and knowledge from the social sciences at undergraduate and postgraduate level (Sanders & Stappers, 2014).

The objective however in introducing any new methods to a curriculum is to also promote a positive learning experience for students. It has been shown that active (McMahon, 2006) and collaborative learning (Entwistle, 2000) can lead to deep learning by encouraging critical reflection (Entwistle, 2000; McMahon, 2006). A peer to peer and group based learning environment is additionally recognised within design education. Symposiums and workshops can also go beyond the traditional learning model, with limited surface learning, to a transformational learning experience of deep learning. Symposiums and workshops can enable students to relate to the content personally fostering deep learning through personalisation and critical thinking (Watkins, 2014).

2: Methods

In user-centred design, many approaches can be undertaken that involve user influence and activity to inform design, namely participatory design (Sanders & Stappers, 2008), universal design (Story, Mueller & Mace, 1998), co-design (Manzini, 2015). there is widespread recognition for the importance of designers to gain empathy with the users for whom they are designing (Kouprie & Visser, 2009). This involves designers becoming immersed in the lives, environments, attitudes, experiences and dreams of potential users and understanding their needs (Battarbee, 2004). This
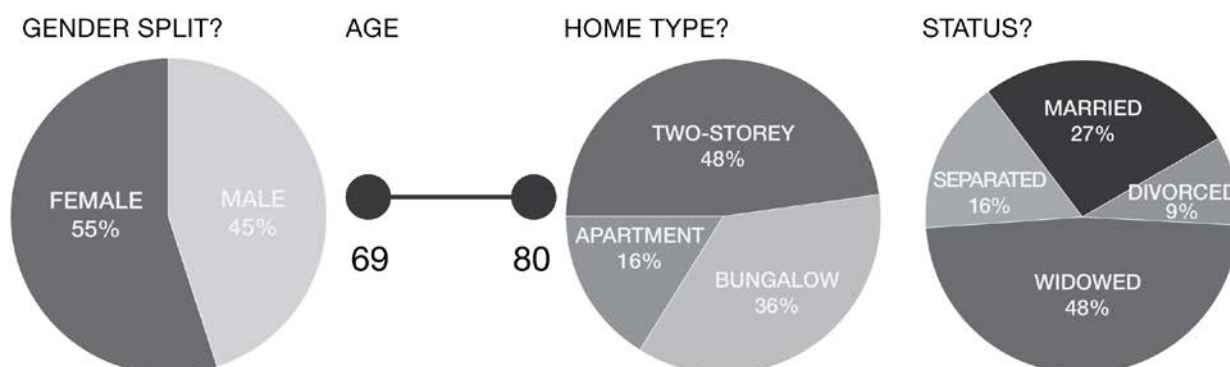
article describes two stages to participatory design project, 1) fieldwork with older adult participants, 2) a co-design symposium with a wide variety of stakeholders. A five-week study was conducted using design and ethnographic methods (Blomberg, Giacomi, Mosher & Swenton-Wall, 1993; Salvador, Bell & Anderson, 1999) with twenty-two Older Adult participants (age range 69 – 80).

2.1: Fieldwork

The themes identified by the coalition to pursue in the fieldwork were: mobility, public spaces, safety, social engagement, and services & facilities. The fieldwork began in April 2016 and continued over a period of five weeks. At this point the researcher was joined by an undergraduate student of Product Design & Technology in University of Limerick who was working on a Faculty scholarship. The role of the student was to learn through experience of fieldwork by accompanying the researcher and engaging with the older adult participants in their homes, and while on task observation studies. During this time, the following qualitative methods were used, informal interviews, task observations, and self-observed diarizing by a selection of older adult participants of their world and day to day activities over the course of one week using cultural probe packs. Cultural probes are a design research tool that gives control of data collection to the participant (Burrows, Mitchell & Nicolle, 2015). The probes did not require analysis (Gaver, Dunne & Pacenti, 1999) but offered further opportunity to gain knowledge and insight from the world of the participants.

This facilitated the opportunity by the researcher to become intimately familiar with the day to day tasks and activities undertaken and to observe and understand challenges and pleasures experienced by the participants in their worlds. The researcher pursued enquiry with a tacit knowledge that was enhanced further by the narrative shared by the participants during the fieldwork. A template was developed for the interview sessions, the format of which would be loosely structured. (See attachment) This template was used as a tool to memo and add notes or sketches during the interviews. The template details information regarding the participant and their 'ref' anonymity. It also consists of open spaces for memo taking and sketching. The headings are listed with some reflective keywords in brackets - the purpose of this is to allow the participant to lead the conversation, however the researcher can introduce keywords of association to prompt or seek expression and opinions.

As a means to display credibility, integrity and rigour, both to older adult potential participants and other stakeholders, ethics approval for the research was sought and approved through the normal ethics procedure of University of Limerick. This enabled an action plan to present to groups and individuals, and an invitation to participate in field studies. The criteria for participants were: participants aged over 65, living in the Limerick environs, who were deemed independent and living in the community. One of the opening questions to each of the participants in addition to the typical age, home type etc., was "are you active?" Interestingly this was a good conversation

GENDER SPLIT?
FEMALE 55%
MALE 45%

AGE
69 — 80

HOME TYPE?
TWO-STOREY 48%
APARTMENT 16%
BUNGALOW 36%

STATUS?
MARRIED 27%
SEPARATED 16%
DIVORCED 9%
WIDOWED 48%

opener; 100% of the participants in both groups answered yes, and proceeded to list activities and interests they pursued. The pool of participants was twenty-two older Adults, as displayed in Figure 1:

Figure 1. statistical breakdown of participants.

The participants were split into two groups of eleven, with Group One agreeing to be interviewed and observed undertaking various daily activities and tasks. Group Two were briefed, and issued with cultural probe packs that would be left with the participants for the course of a week. These participants would diarize and record items or experiences of interest. The packs were issued in a large wallet, and consisted of the following: 1) A mood board and stickers that the participant could very quickly indicate positive or negative experiences from each day and for each of the themes. 2) A scrapbook and glue stick to place articles, or items read or noticed. 3) A disposable camera to use as they wished for photographic capture and storytelling. 4) A notebook to write and express what went on each day.

Figure 2. Cultural probe pack (left) older adult participant with researcher (right).

During fieldwork, it was important to measure the effectiveness of the experience by the student accompanying the researcher, observations to note were:

- Initially the student was quiet and somewhat unsure of the freedom and flexibility to be curious with the participant.
- By session two, the student grew in confidence and began to enquire and express her curiosity to understand and empathise with the experiences and stories shared by the older adult participants.
- The participants were curious about the student, sometimes they would talk in terms of generational difference, i.e. *in my day...*; *would it be like that now*? There was a warm rapport and interesting exchange between both.

On conclusion of the experience of being out in the field, the student reflected on the work and experience gained, stating:

"At first, I was quite nervous about how to interact with the participants, as I had not conducted any research in this way before. One of the key things I remember from the visits was learning that a conversation is much more valuable than an 'interview'. From watching and listening to Linda I learned a lot about gathering information through gently guided conversation. Without the formality of interview questions and the pressure that they can bring, the participants felt free to direct conversations to the things they felt most passionate or annoyed by."

"I was not lucky enough to know my grandparents very well as an adult. I have incredibly warm and fond memories of them from my childhood, but these are really the only interactions I have had with 'older adults'. Before I became involved with the project, this was not something that I had thought about. In the weeks, I spent speaking and listening to the participants in the study, I realised what a terrible absence that was. Older people, from my experience of the ISAX project, are full of life and a genuine desire to share their knowledge and stories with others. There are many misconceptions about old age out there but the mental strength of the participants I met made me reconsider my 'preconceptions'."

"There were also serious and more sombre conversations, highlighting areas where older adults were not being catered for. Without these conversations, the mix of fun and reality, I would never have considered some of these problems."

This sharing of experiences highlights the impact and valuable learning that can be gained out in the field. When students are attentive to values, meanings and aspirations of those they are designing for, it can contribute to human flourishing (Lynch, 2015). An example of this approach is the Engineering for Humanity course in Olin College of Engineering in Massachusetts. During their first year, students on this programme each work with one older adult participant, and throughout a semester, identify a problem, to develop and build a solution. The older adult participants are recruited from the community and surrounding areas of the campus, the module is described as a *"complete start to finish process of learning to design for a single user"* and this activity, it is believed helps students develop and build meaningful relationships with participants, and an awareness that the solutions can make real difference to people's lives (Lynch, 2015).

2.2: Co-Design Symposium, Limerick, June 2016

Co-design can be considered 'messy', the collaborations of as many stakeholders as possible have input to the design process. This participation, in turn affords an iterative process that encourages autonomy and ownership between stakeholders, with outcomes and intent collectively developed (Donetto, Pierri, Tsianakas & Robert, 2015). The older adult participants offered expert perspectives of their lived experiences (Sanders & Stappers, 2008). The role of the researcher was to gather those insights and translate them to effective needs statements that each group could work with on the day of the symposium. Participants and partners of ISAX were invited to work together for one day on design solutions identified and stated as, 'needs statements' for each of the five themes observed during the fieldwork:

1.   Mobility – Need: Improvement of accessibility experience outside the home – Bus access, parking, cyclist awareness & pedestrian experience.

2.   Public Spaces – Need: Older adults with reduced mobility and their carers require access to busy areas safely, efficiently and conveniently, as a means to conduct everyday tasks and social engagements.

3.   Safety – Need: Older adult safety and reassurance when outside the home.

4.   Social Engagement – Need: Interaction, support and communication across communities and generations.

5.   Services & Facilities – Need: Impartial trustworthy guidance to manage and plan finances and bills in the following areas: banking, general utilities, mobile phone options & estate planning.

Figure 3. Sample of attendees, including older adult, under graduate & post graduate participants from University of Limerick.

To enhance empathic communication, raw data including photos and videos of users in their home and individual stories and quotes have been advocated as a way to let designers make personal connections to the users' experiences (Sleeswijk Visser, Stappers, Van der Lugt & Sanders, 2005; Fulton Suri, 2003; Sleeswijk Visser, Van der Lugt & Stappers, 2007) as how users are visually depicted can promote or hinder empathic understanding (Sleeswijk Visser & Stappers, 2007).

There were various artefacts of research evidence (video displays, storyboards, photographs, diaries etc.) displayed and available for all attendees to view. The research evidence expressed in tangible ways the older adult experiences recorded during the research. Highlighted were various 'joy and pain points'. The 'joy points' ranged from simple things such as well-placed park benches, opportunities for social engagement, volunteering, gardening, friendships and family life. The 'pain points' showed up problems as diverse as a lack of 'set down' areas for cars in Limerick City to 'drop off' a relative, unsafe street crossing areas, car park spaces with limited ambulatory accessibility, tablet blister medication packs that were a challenge to open, and personal security devices that didn't offer reassurance to users.

Participants then worked in teams of ten to build new solutions for these problems, facilitated by design staff and students. Each team focused on one of the themes and comprised of stakeholder attendees, designers (students and staff from School of Design, University of Limerick., Institute of Technology, Carlow, Limerick School of Art & Design) as well as two to three older adults who had been involved in the research. Co-design implies a need for the designer to become the facilitator (Sanders & Stappers, 2008) that encourages creativity by all.

Figure 4. 'Pitch' role-play delivery by group facilitator.

Co-design encourages stakeholders to become part of the design team, and this experience can be enhanced by the provision of the right tools to assist creativity (Sanders & Stappers, 2008) and freedom to express. The teams worked together and availed of tools and discussion to assist and generate ideas. These tools were: modelling tools, whiteboards to map and visualise thinking, artefacts from the fieldwork – diaries, scrapbooks, and large printed boards with summary to each theme. These summary boards encouraged group talk and interactions with other attendees for further discussion, see Figures, 5, 6, 7, 8, & 9.

Figure 5.

Modelling tools were accessed and used by all throughout the symposium.

Figure 6.

Mapping interactions and relationships on whiteboards.

Figure 7. Contextual tools from the self-observation groups were displayed: scrapbooks with images and diaries with narrative of day to day thoughts by each participant.

Figure 8. Further selection of modelling tools displayed and used to relay narrative and concept development.

Figure 9. Discussion locations were encouraged beyond the tables of each team to encourage interaction, Tools to support commentary are the theme backdrops as displayed in the background of this image.

3: Findings

This section discusses the day's activity outcomes from the concepts produced, in addition, reflections from the experience are shared by a snapshot of attendee and organising students and lecturer. Towards the end of the Symposium, each team was invited to 'pitch' their idea and express the benefits of each design solution. There were ten design solutions offered:

1. Mobility

   - Solution 1: Volunteer Support Service Club

   Create a new membership club, which is aimed at improving access by foot or transport links to commercial or public buildings. The club would engage early retirees, second level transition year students and others interested in volunteering their time, to 'map' good pathways or access links to bus schedules for onward/return journeys by public transport or for car parking spaces.

   - Solution 2 – Improved Car Parking Spaces

   Getting in and out of cars more easily by alternating (L-shaped) car parking spaces, to ensure that car doors can be opened fully, and designing age friendly 'logo' for specific car parking spaces.

2. Public spaces

   - Solution 3 – Designated Drop Off Points

   Create 'drop-off' points accessed by drivers, dropping off less mobile persons. Each car would have a sticker ID on the windscreen provided by local policy makers. Signs and way finders would ensure the person dropped off is aware of route back to pick-up point.

   - Solution 4 – City Ambassadors

   Focus on passenger experience with reduced mobility. City ambassadors working within 1km of city centre, near banks, post offices and hotels, to provide support and information at drop-off points and main car parks.

3. Safety

   - Solution 5 – Safety in the Home Poster

   Design an interactive poster for the home that is linked to a smart device. Buttons will have short cut icons to activate calls to family, emergency services, taxi, and house alarm.

   - Solution 6 – Sub-dermal implants
   Automatic contact that is always on and is always worn. Sub-dermal implant worn by users for fall or other security alerts.

4. Social Engagement

- Solution 7 – Hands of Friendship Network

This group would engage with new members of communities or areas with older adult population to make new friends and/or re-engage with an area. Building trust, a "Hand of Friendship" group would grow through word of mouth and social activities.

- Solution 8 – Generation Allies

Inter-generational activities through a 'Generation Hub' – a community space, to facilitate trust, collaborative learning and laughter. Using 'Generation Allies' over the lifespan, so that security, respect, health, friendship, advocacy and wisdom can travel in both directions. Suggested tasting event, e.g. BBQ, communal garden. Inform and invite new members using radio, social media and 'Tell-a-friend' methods.

5. Services & Facilities

- Solution 9 - Digital Training

Fear of technology is limiting access to online services. Access to a connected device and internet availability are two major issues. The suggestion was that the state offers retirees access to training that will enable people to become digitally literate. Once trained, an incentivised scheme would empower people by providing internet access with a suitable device with apps to access sites such as banking, flight booking and government agencies.

- Solution 10 – Service Navigators

Service system to help people to manage their affairs and provide information that leads to informed decision making, e.g. appointing an executor for a will, putting 'power of attorney' in place for future, opening/closing accounts with utility companies. Part of the service would be to provide trusted 'navigators' who can facilitate when needed, e.g. set up a meeting with someone from a utility company, go to medical appointments, or to provide knowledge to assist decision making for major purchase (car). Put a loop system in place to ensure that every service item is managed to its conclusion.

On conclusion of the 'pitch' (figure 10), the attendees were issued with stickers and invited to vote by applying a sticker to their favourite solution. This democratising and validation of opinion led to a clear winning solution; however, the real objective of the day was achieved, a demonstration that cross collaborations between older adults, students, researchers, policy makers and industry stakeholders can deliver efficient and tangible solutions to identified unmet needs.

Figure 10. Older adult participant 'pitching' the benefits of their design solution to attendees.

3.1: Reflections

As a means to learn and understand experience from the perspectives of lecturers, students and stakeholders, involved in the organising and facilitating of the symposium, questions were devised and sent out to gather knowledge and insights. The questions posed were:

1. Prior to attending the co-design symposium, what were your expectations or thoughts to the practice of co-design?
2. During the day, what observations or experiences did you find beneficial to the application of engaging with the various stakeholders and themes of the day?
3. Since the co-design symposium; are there any take-away thoughts or actions that have been inspired, and you have applied to your work – reflections?

To summarise the answers, it is clear that there was an element of anticipation and uncertainty to the day by the answers expressed for Question one. For Question two, there is a certain amount of freedom and passion expressed by the activities undertaken on the day and the interactions with other attendees and participants from the fieldwork. The actions expressed in Question threes answer, endorses the activity of co-design as a collaborative exercise with solutions created and stakeholders involved with designers and design researchers.

Sample responses:

Q1: Prior to attending the co-design symposium, what were your expectations or thoughts to the practice of co-design?

> *"Was nice and ideal in theory, but the practice wasn't always as easy, fluid or productive!"* (Lecturer)

> *"Before attending the co-design symposium, my expectations were based on my experiences in working with clinicians during my own research to inform design decisions. This involved a more solo approach to design in order to generate design milestones, for which the clinicians would then be present to offer guidance and feedback."* (Student)

> *"I was looking forward to taking part in the event, I was interested in seeing how designers interact with users and input from anyone really. I wondered if the designers would take control and dominate the tables."* (Student)

Q2: During the day, what observations or experiences did you find beneficial to the application of engaging with the various stakeholders and themes of the day?

> *"Having the themes and problems set out really helped to focus the projects at the start. Having the older adults present really brought the issues home and trashed my preconceived notions about the limitations (or lack of limitations as I found out) of older adults."* (Lecturer)

> *"Interestingly, and perhaps obviously, dealing with clinicians is much different than working with the stakeholders during the co-design symposium. Clinicians tend to deal with cold hard facts, whereas it was quite refreshing to engage with stakeholders with a sense of empathy. There was also a more conversational approach to informed design too, which was also a stark contrast to the structured feedback sessions I've experienced in the past."* (Student)

> *"Loved the whole day, I thought it was great brainstorming together and getting to know people while doing it. During the event, I noted that one of the moderators, while helping and building the tables as she walked around, was pushing certain solutions to us. I don't think it was intentional but the opinions and biases from organisers is very influential… On the day were we all her 'Users'? At the end of the day, the team I was a part of won the event with the most votes. Our team was the only one which had a user present the work instead of the designers (which every other team did)."* (Student)

Q3: Since the co-design symposium; are there any take-away thoughts or actions that have been inspired, and that you have applied to your work - *reflections*?

> *"I would love to have real-world insights into the users and bring in a co-design process into all of the student projects since but this isn't always possible!" (Lecturer)*

"I believe that the key take-away experience that inspired me was the enthusiasm of everyone involved. While each group appointed a leader to keep each group on track, there was equal involvement from everyone. No idea was discounted, and there was a great sense of collaboration which culminated in an overwhelmingly positive experience. The symposium has helped me personally by giving me experience into working with people other than clinicians, and perhaps a more accurate reflection of co-design." (Student)

"Since then I question, is there a difference between HCD (Human Centred Design) done well and co-design? In practice, it's all about listening to each other and taking part in the co-design event has reinforced that to me. I also believe the role of the designer will still be important when working in these user lead/orientated sessions. A great metaphor I came across which explained this was: the designers and other stakeholders are like an orchestra, each play their part and the designer acts like the conductor which helps keep everyone in sync and flowing together." (Student)

4: Discussion

The value of collaborations between students, industry, organisations, and in this example, older adult participants, display the effectiveness and impact these kinds of coalitions can influence on product and service system design. Design is a social process and constructivist theories of learning recognize that learning is a social activity (Wenger, 2000; Bucciarelli, 2002). Collaborative and active learning through projects that integrate multidisciplinary specialists and end users is also an approach that better facilitates the solving of today's complex design problems (Seidel & Godfrey, 2005). Design education should be refocused on teaching designers to function in multidisciplinary teams emphasizing the complex process of enquiry, learning and decision-making through working collaboratively using several languages (Dym, Agogino, Eris, Frey & Leifer, 2006). Links with industry and communities to create real-world design projects are crucial to the education of designers (Cardozo et al., 2002; Watkins, 2014). The landscapes of design and design research will continue to change as design and research blur together and designers increasingly co-design with users and stakeholders.

Furthermore, it offers students in higher level education insights to see beyond the studio and gain experiential awareness and empathy for the value of co-design. In a studio-based learning environment the student can be encouraged by the facilitative approach of lecturers. This can motivate the students to become critical thinkers and display an ability to influence and research through design. Kolb's (Kolb, Boyatzis & Mainemelis, 2001) experiential learning model, where knowledge is gained through experience, displays the responsibilities learners (students) have when undertaking this type of project. Design students are further encouraged to have the courage to create (May, 1975) and become self-starters, self-motivated and driven towards sustainable change (Designers Accord, 2011). By encouraging learning beyond the studio and immersion with users as a co-design strategy; minds, curiosity and empathy can be embedded as a subconscious tool. This

collaboration paradigm has previously been shown by DeVere, Melles, & Kapoor, (2010) to encourage social responsibility and sustainability among students. It also influences an approach to develop a responsibility to design, delivering projects that can influence real world problems (De Vere et. al. 2010). The co-design symposium is a clear example of what can be achieved when a cross disciplinary approach is undertaken. This is not always addressed through application in a design education context.

An additional benefit through the symposium was in the case of postgraduate students who tend to be most isolated in conducting their individual projects. The symposium afforded them to collaborate with others, refresh their thinking and establish networks bringing additional benefit to their own projects. Suggestions to improve this approach would be to encourage workshops or small studio team based projects. Students would work with a specific cohort through a user based approach to enquire into and explore the unmet needs of daily problems people experience with product and service systems.

A further suggestion would be to undertake a cross disciplinary post graduate program with an industry partner to 'mesh' design through research and collaboration with specific user groups. The objectives of this collaboration would be to identify and define unmet needs in product and service systems. Addressing collaborative practice between Stakeholders encourages the use of co-design and collaborative coalitions to maintain user experience at the centre of the design method.

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