BRIDGING THE GAP – A CO-CREATION EXPERIENCE OF NOVICE DESIGNERS AND ELDERLY USERS

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ABSTRACT

Most design and engineering students aim "to create something that is having an effect on... people's lives" [D1] and, consequently, put much effort in learning and practicing how to design and innovate properly. Only hardly surprising, technological feasibility is one of the main drivers of new product development activities. Alas, this conflicts with the fact that people only love products that meet their needs. As there is a gap between user-driven and design- or technology-driven requirement analysis, it is essential to educate students not only in designing the products rightly but also in designing the right products. Recently, co-design activities are emphasised as promising to connect industrial designers with target audiences who differ largely from their own experiences and expectations. To develop successful products for these target groups, the experience gaps between users and designers need to be bridged within the design process. If the aim is to create something that affects people's lives, it is required to focus on the people. This paper analyses the learning experience of industrial design students during a co-creation experience with elderly people and derives essential competences in which user-centred designers should be educated and trained.

Keywords: Co-creation, design education, design research, user-centred design, design methodology

1 INTRODUCTION

Design should serve people. The basic prerequisite is that that engineering designers understand what actually serves their targeted people. Although user-centred design has a long tradition, it offers little help designing for special target groups. Seniors, for example, are extremely diverse, individualised and highly contextualised, making it very challenging to generalise their opinions and preferences. Likewise, it shows up that engineering designer's assumptions about what special user groups may like or not like are often quite wrong. The paper aims to contribute the question how design students can be taught to empathise with users in such way that they find the solution really needed instead of the solution technically best possible. Therefore, learning experiences from the user-centred design workshop 2018 (UCD_2018) with students from industrial design and healthcare will be presented. This study focuses on the co-creation experience and the identification of key competences user-centred designers need by revealing how students reflect their own learnings and role in participatory co-design. Section 2 introduces relevant aspects of user involvement in design activities. Section 3 briefly presents the research methodology chosen here. Section 4 presents the findings by which implications for design education are derived in section 5. Eventually, conclusions are drawn on the appropriateness of a co-creation workshop as teaching concept for user-centred design.

2 DESIGN FOR, BY OR WITH PEOPLE

The product's effect anticipated by engineering designers is to assist users in coping with their everyday life, to bring pleasure or simply to support specific actions. Hereby, it is crucial to understand users in their desires and needs and to align development activities accordingly. Several studies discussed that

frequent and intimate user involvement is important for improving product concepts as well as for improving innovation capabilities [1], [2].

Carmel and colleagues [3] distinguish three degrees of user involvement. In consultative design, users have little to no influence or control over the outcomes of the design. In representative design, a few chosen users are taking part as representatives of the user group in design formulation and decision-making. In consensus design, users are continually involved into the system development process. That corresponds to the three user involvement strategies, design for, design with and a design by, presented by Kaulio [4]. In a 'design for' strategy, users are more or less research objects from which the designer can elicit information and requirements. On this level of involvement, users usually get no information about the existing or planned product design. If users are involved into the design process as evaluators or feedback providers of design models and prototypes, this corresponds to a 'design with' strategy. As soon as the borders between users and designers start to blur, i.e. users take also part in developing and selecting of different design solutions, this complies with a 'design by' strategy.

Generally, co-design stands for "the creativity of designers and people not trained in design working together in the design development process" [5, p.5]. User participation processes on this degree are dynamic and complex, and therefore more challenging than closed innovation processes. They place new demands on the development process, in particular the need for a new, open mindset. Hence, there is a need for approaches to support designers in addressing both the user's demands and their expertise in the solution finding. As new concepts for training and further education for industrial design are needed with the emerging changes in design paradigm [6], here a co-creation workshop was chosen as teaching format for user-focused design.

Reviewing literature (e.g. [7], [8]), the impression is given that sometimes co-creation as process is a goal in itself [9] and many research papers do not even attempt to validate their findings [10]. For engineering designers, it is essential to be able to verify and validate their achievement of clear objectives for at least two reasons. On the one hand, if the potential of applying co-design methods should be used to rebut clients' concerns about higher costs and prolonged development times with better results in terms of novelty and brand positioning, then this potential must actually be measurable. On the other hand, the aim of co-creation activities is to complete specific design tasks more precisely. However, this can only be achieved if the methods used are chosen appropriately, which in turn requires that the outcome of a method's use can be measured and compared with regard to external target values. Considering this, our aim was to validate the appropriateness of using a co-creation workshop for teaching user-centred design.

3 RESEARCH METHODOLOGY

The User-Centred Design (UCD) workshop of which the co-creation workshop was a compulsory part of (at least for the design students), was attended by 45 second-year students (the degree lasts for 5 years) of industrial design and different health disciplines and in the first semester of 2018. The workshop took place at the School of Design of the University of Bío-Bío in Chile. The co-creation workshop consisted of three main phases. In the introduction phase, an essence of user-centred design lectures was held. Afterwards, students were introduced to the task for the design challenge, namely *"Design a product based on the needs and requirements of real users, applying user-centred methodologies"*, and the target group. In the second phase, narrative interviews and observations were conducted in order to identify and analyse challenges of the elderly's everyday life. Eventually, in the third phase, the co-design process took place. In Bío-Bío, design education culture is traditionally design-driven. The aim of the workshop was to show that traditional design methods and tools are not powerful enough to understand users holistically in their behaviours.

This study addresses two main aspects of user-centred design education. The assessment of the co-creation workshop with regard to the students' learnings experience should validate the appropriateness of such teaching approach in terms of meeting the learning outcomes specified in the module description of the study programme. This cannot be done by recording grades solely but has to be recorded in a competence-oriented manner. Therefore, one month after the workshop, interviews were conducted to understand the students' learnings. On the one hand, the interviews aim to shed light on the actual learning outcomes. These then are compared with the ones explained in the course description of the faculty and thereby this teaching format can be assessed. On the other hand, an in-depth examination of in particular the difficulties the students did experience during their co-creation process, leads to

essential insights towards the competences, which are required to be educated and trained in future. Therefore, the research questions were formulated as follows:

- *Which learning outcomes can be achieved by using a co-creation experience as teaching format?*
- *Which specific competence needs can be derived from the experience of co-designing with elderlies?*

The sampling strategy followed a classification of the students based on four criteria. Students that were highly motivated to participate (A), students with low motivation towards the workshop (B), students that were highly design-driven (C) and students with a user-focused perception of design (D). The students were sampled according to their availability, the selection process was ongoing until theoretical saturation was reached. Finally, the sample consisted of nine representatives of all identified design profiles who were asked using a semi-structured interview guideline about the value and impact of their co-creation experience. The interviews were transcribed and NVIVO software was used for the analysis, which was carried out in tradition of the Constant Comparative Method as proposed by Glaser and Strauss [11]. Initially open coding was made, identifying essential aspects, which then were organised through an axial coding process. Hereby, relevant insights in the learning behaviour and competency acquisition of industrial design students had been derived.

4 FINDINGS AND ANALYSIS

Although they had been very impressive, this study is not aimed at the presentation of the product solutions resulting from the co-creation but on the solution finding process itself. Hereby, the interaction with the elderly, especially the understanding of their needs, whereby this was achieved and how it affected the concept development of the students is of particular interest. During the coding process, three main categories in terms of design for the elderly were extracted addressing the dimension of the designer, the process and the user, each divided in several sub-categories.

4.1 Being designers

As reported by the students, main strengths of designers addresses their ability towards decision-making and solution-finding: *"you focus on a problem, and through that problem, find another and, try to solve both, but it can't be done, you need to find a main problem... you have to focus on a problem that may, perhaps, be related to others, but, on one main one"* [B1]. *"You study design, but at the end of the day, you study a formula about how to reach a result, but... where you have to bring in different viewpoints"* [C3]. A complex aspect of design is the need to consider multiple variables, which forces designers to get to know diverse issues that are relevant to the product or service to being developed. It needs to be understood that the creation may be virtuous for some, but negative for others. The responsible evaluation of these aspects by referencing to diverse areas of knowledge is perceived as being the key ability of designers. This concerns research activities, which include collecting the essential information needed to end up with an appropriate product or service finally. Besides that, the individual perception of things adds originality to the design, because it provides the creative foundation for designing personal and unique versions of design objects. The aim of design is clearly addressed: *"as I said before, user-centred design is closely tied to changing the quality of life of people (.) This, this is like the social aspect of design"* [B1]. Given their responsibility for information gathering, decision-making and problem-solving, it is not difficult to comprehend why designers sometimes, even if this is somehow contrasting the previous statement, tend to rely on their own experiences instead of getting engaged with users directly.

4.2 Experiencing co-creation

In general, the students stated that they had high expectations and motivation towards the workshop when they were informed that direct interaction with users would be the fundamental part of the design process: *"my expectations... were high, like... great, being able to work with real people, who give me knowledge beyond what we have learned from us-teacher, teacher-student, so... I had a lot of expectations, more than anything, with the thing... that at the end of the workshop, we would have to build it, so that the people have the object"* [A1]. Another aspect that generated high expectations was the chance of interdisciplinary working with students from the health area: *"on finding out that it was user-centred teaching and it was connected with the medicine faculty, it immediately caught my attention... I don't know... I imagined loads of design options... I imagined good collaborative work..."* [B1].

On the other hand, being offered a new design experience was perceived ambivalently: *"ok, when I knew it was going to have user centred design, I think, I was a little unnerved, a little scared even, because I think that all new workshops are a challenge, because of the commitment this means... it was the first time where we were really working with a user"* [C3].

The students highly valued that within the workshop they were given a first chance to design a prototype finalised by direct interaction with users and not just based on their personal beliefs and observations. User involvement as design strategy was perceived as useful for their future professional and educational process. All the participants agreed that the initial ideas were highly complex because they tried to solve multiple needs of the elderly people. However, the permanent interaction with and observation of users led to a more concrete and equally useful product concepts: *"in our work, the conflict was that we had to completely change the perspective of what we had initially though was going to help, but in reality, we needed something a lot simpler and much less spectacular than what we were doing"* [C2].

The user-oriented design methodology activated and sharpened the students' design skills, allowing them to move from complex to rather simple solution concepts, without being afraid of this might meaning less improvement in the user's quality of life: *"there was a moment during the workshop where we had to bring in our user, present many proposals to them while they provided relevant information and... from that moment, we changed from having this great thing that solved everything, to a simpler gesture... adapting to the problem"* [C1].

The students appreciated the possibility of applying their knowledge on a real case, *"that is a personal plus, mixing the different techniques that we've learned. I don't really do much observation and... in fact, I really liked this workshop because, it is real data, it's not just something that I simply saw... researching, I like researching."* [B1]. Especially the more "design-driven" students emphasised the use of additional user participation techniques like interviews and observations, adding benefit the use of technical information and statistics associated to the idea or prototype: *"it's just that it was a new method, it was a new method, a new approach, so, I feel that... we were all a bit lost with this method... it is not like... so, well, it was difficult, the whole thing about life (.), but just like all new processes, the truth is it wasn't so difficult"* [C1].

4.3 Understanding users

Direct interaction with the target group did have major impact on the students' perspective on elderly people: *"I'm a little embarrassed by it, but I said oh... I don't want to work with old people... it was like, I had a negative view about that and as the workshop went on, I lost a lot of my preconceptions"* [D3]. *"I realised that I hadn't really focused so much (.) In the way of seeing people, be that elderly or any people. It helped me focus... I got on board and started to pay attention to everything, fixated on everything, the life of the users, the people"* [A1]. *"I didn't really understand what a user was... So, it was... it was like... it's like key now, I think... now I think that for me, my graduate project is going to be really related with the user now, because right, it was, with the... it is really impressive how our project was changing with the usability tests"* [D3].

For some students, attending the workshop did not result in concrete learnings of the user-centred design perspective only, but initialised reflections about their own role as designers and the importance of their work for the people involved: *"now we have worked with people, and you get to know their problems, you get to know their life, you share with them, so it is completely existential. It left a mark, because it was the first encounter with reality and a process of maturing understanding that I'm not designing for me, what you think is difficult for elderly, does not mean it is difficult for this elderly person."* [D2]. *"I feel that with the workshop I started to value the elderly a little more... who came to tell us how like, ok, this means that... this is what you have to do with them, this is how you work and everything, this is how they act, so, now I see them in another light"* [B2].

As user-centred designers need to engage with the users directly, a complex issue for several students was reaching elderly willing to participate in the workshop. In fact, many of the participants were family members of some students. The challenge of limited access to representative users of the target group can be found stated in practice, too. Another issue was the interaction with a previously known user group: *"Often, you treated an elderly person like a kid, like... oh, come this way, but no. These are normal people and, of course, they taught us how to treat them but, in a certain way... it seemed complicated, but as time went by, the way to chat, to work with them was like, very natural"* [A1].

The most benefit was seen in the constant revision and discussion of the concept ideas, finally reaching a balance between the elderlies' and the students' visions: *"the challenge was like... trying, looking for...*

the perfect problem. Because we had so many, we collapsed for a moment and... we didn't know where we were going... we wanted to solve them all, and then we saw a specific issue, trying to develop an idea that, that did in fact have grounds" [B1]. Having users involved in the design process means that all requirements identified are directly validated by them: *"getting the elderly person to get involved... in the issue... that he, he can practically make the... design as he wanted, what he needs, not what we imposed on him"* [A1].

5   IMPLICATIONS FOR DESIGN EDUCATION

On the level of participatory design, users are not only asked to contribute information according their wants, needs and product requirements but also are invited to bring their creativity and problem-solving skills. As the professional role of designers change, new competences need to be educated and trained. Competence is defined as expertise, skills, capabilities as well as responsibility [12]. Proposed synonyms are talent, ability, qualification or gift. Here, competence is understood roughly as the capability (knowing how to do something) by which a person can master a specific situation (knowing what to do). Table 1 summarises the main competences as announced to be the learning outcomes according to the course description, derived as actual learning outcomes extracted from the interviews and, finally, formulised as teaching goals for further curricula development.

As can be seen, main competence areas has been delivered by the workshop: personal competencies (adaptability, self-reflection, willingness to learn), social-communicative competencies (empathy, communication, teamwork), activity- and implementation-oriented competencies (solution-finding, knowledge management), methodological competencies (interview techniques, ability for applying tools, presentation skills) and professional competencies (prototyping, complexity-reducing). Considering this, the conclusion can be drawn, that co-creation workshops are an appropriate teaching format of teaching user-centred design to undergraduates. Hereby, compared to traditional education formats, especially the learning impact of increased knowledge transfer, training effect and high motivation by applying to a real-life case should be highlighted.

Knowing design methodology just from regular frontal teaching, some students initially felt insecure of succeeding the workshop in terms of their skills: *"I really didn't feel prepared"* [D1] for the task. However, the aim of design education should be to getting students prepared for real-life design tasks.

Table 1. Competences for co-designing with elderly people

Expected learning outcomes as announced by the faculty	Learning outcomes as stated within the interviews	Learning goals for future user-centred design curricula
requirement analysis skills	*emphatic abilities*	*empathic abilities*
knowing user research tools	*methodological knowledge*	*assessment of methods*
knowing UCD methodology	*interview techniques*	*applying research techniques*
applying UCD methods	*applying data collection tools*	*applying research tools*
realising social responsibility	*ability to work in a team*	*interdisciplinary working skills*
communication skills	*communication skills*	*communication skills*
presentation skills	*presentation skills*	*personality skills*
product design skills	*complexity-reducing skills*	*prioritisation skills*
development skills	*solution-finding skills*	*solution-finding skills*
materialisation skills	*adaptability*	*adaptability*
reflecting the designer's role	*self-reflection skills*	*decision-making skills*
conceptual and contextual skills	*willingness to learn*	*user identification and contact*
applying visual representation	*prototyping skills*	*market valuation capability*

Although the students achieved the learning outcomes as announced in the course description and did highly appreciate the workshop format, there is always space for improvement. Accordingly, essential competences, which have to be enrolled in the design curricula are summarised in table 1. Above and all, a learning environment has to be provided promoting the learning of students, considering *"the physical space too, because, as we know that we work with many things, in general, here at home, you don't have the space there is in the school, so, sometimes I have to model or work, I don't know, cutting wood and the only space I can do that is at the school"* [B2].

6   CONCLUSIONS

Working with new or previously underexplored groups of people can be challenging. Nevertheless, it provides the chance to reflect on one's own assumptions and long held beliefs about methods and existing practices. Involving users as co-creation partners in the design process guided the students to grasp more precisely the social role of design and its impact on people's quality of life. It also implies the value of designing an object with respect for someone's needs and not just as being a personal creation. This exploratory study does not ground on a random and representative sample. One has to mind that several biases might have affected the results in different ways.

On the one hand, a longitudinal study design is needed in order to reflect the sustainable impact on student's learning and mindset. On the other hand, interview effects could have had occurred if the students were expecting influences on their future grading. However, one of the strengths of the selected workshop is the consideration of experiences from both design-driven and user-driven design students. It turned out, in the end, the learning outcomes were nearly the same for all categories of students. If future workshops will be conducted, it is highly encouraged to add a reflection session on the prototypes developed, in terms of scaling the solutions to other users, ways to market and aspects of market positioning, as the students were missing such part. It would be really enriching the learning experience if industrial partners could be found willing to provide this format with construction materials and design challenges and possibly even implement promising solutions. This could be organised as kind of summer school or short-term internship, for example.

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