INTEGRATING DIFFERENT USER INVOLVEMENT METHODS IN DESIGN CURRICULUM

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ABSTRACT
User involvement is increasingly gaining recognition and the number of user-researchers in the international design community is growing. However, the question: "Designing with users, how?" implies great challenges for scholars and educators, such as if user involvement necessarily results in user empowerment or just complies with an ideology of involvement, and if it leads to better products and services. The author discusses different concepts of user involvement and presents an education effort to teach user involvement methods in a Master Course in Sustainable Product Design. The methods are located within three domains - an abstract, a fictional and an in-situ user involvement concept. They have to be applied in the course during the last two years. The impact of the different methods on the students is discussed by analyzing some of their group works in the course. In summary, it seems that sustainable product and -service design curricula may advance by adopting a thorough user perspective. Generating knowledge on the benefits and pitfalls of the different concepts, and on how these influence methods and design practice is however crucial to integrate user involvement successfully in sustainable design curricula.

Keywords: User involvement concepts and methods, personas, interviews, co-creation

1 INTRODUCTION

The main hypothesis of this paper is that different concepts on 'users' produce different methodologies and practical approaches for user involvement. Therefore, it is important to teach students what kind of concept they work with and what kind of results they can expect. The objective of this paper is not to give a final account of all user concepts but to expose important relationships between the interpretations of users and design outcomes in a curricula context. I teach the selected concepts in a Master Course on Sustainable Design and have tested them within a period of two years. They represent exemplary approaches: Design as problem solving [4], design as reflective practice [8], design as semantic construction [11] and design through user innovation [14] with explicit views on the users' role. Following this introduction, the second section of the paper discusses the concepts above, before coming to the course and an appraisal of students' works in section three. Section four concludes with a discussion on benefits and disadvantages of the different user involvement approaches and their appliances in design curriculum.

2 KEY TERMS AND CONCEPTS

The term user implies quite different interpretations. The most common explanation means a person who interacts directly with a product or a service. Eason[1] placed users in three categories: (1) primary users, i.e. frequent hands-on users; (2) secondary users, using the product/service through a mediator; and (3) tertiary users, people who are affected by the product/service and might influence its purchase. Business theory classifies among others between lead users, people who are pioneers for products/services that might become trends later on [2], and end users, who finally employ the product/service. This paper applies the first explanation signifying the role of users in different design concepts. Involvement [3] means here (ontologically) to participate mentally or physically through engagement and action and (epistemologically) ways of thinking how this participation could take place. The focus of this paper is on how the concepts consider user involvement, what role it plays and (if) how it is practically done.

Design as problem solving: Herbert Simon's design concept consists of two aspects that influence his view on users significantly: rationalism and pragmatism. The rationalist/positivist view manifests in

the assumption that knowledge about nature is 'objective', unconstrained by the development of the natural sciences. For Simon, design can e.g. mediate a "…body of intellectually though, analytic, partly formalizable, partly empirical, teachable doctrine about the (design, M.K.) process" [4]. In the 'Science of the Artificial', Simon asserts further that design has to solve 'ill-structured problems' and that time and money is often lacking. Because of time-money constrains, design processes are always concerned with "resource allocation" [5]. Pragmatist/instrumentalist is the belief that something is true if it works satisfactorily and that unpractical ideas should be rejected. Simon's theory of design as problem solving is centrally concerned with how people handle complexity by reducing the (design) problem and selecting a solution from a set of alternatives. Simon claims that a large part of design problems can be solved by heuristics belonging to bounded decision-making [6]. Bounded decision-making means that choices are limited by lacking information, cognitive limitations and a finite amount of time to make decisions. Simon sees users as 'designers' and perceives a relationship between 'official' designers and users game-theoretically: designers make a move through design, and users make a countermove by utilizing the design, which in turn might trigger improvements. This game-theoretic concept on interaction between designers and users the second play a role after the designers made the first move. Simon's approach remains thus cognitive and instrumental, rather putting weight on the underlying logics of the game than on the social dynamics. One could refer here to abstract or symbolic user involvement [7], where input from users theoretically considered but does not take place in the concrete design process.

Design as reflective practice: Donald Schön's concept concurs with pragmatism and pedagogy i.e., the primary motivation for human activities is always a practical need and education is a necessity and a pillar for the continuity of our culture. Schön's crucial argument is that lifelong-learning is possible (and desirable). This represents a hermeneutic (self-reflexive) endeavour that connects existing professional experience with surprise, or even confusion within a situation, which is uncertain or unique [8]. This 'reflection-in-action' can (dialectically) contribute to a new understanding of the problem and change a situation. By becoming aware of former tacit frames, the practitioner sees now new links and relationships to the problem. Schön asserts that the cultivation of the capacity to reflect in action (while doing something) and on action (after having done it) as well as the ability to engage in a process of continuous learning is defining characteristics of professional practice. Schön's theory is language centred and so is his user involvement approach. Besides his arguments for explanatory communication (teacher-student, designer-client relationships) his claim, that that the framing of problems often depends on stories for problem setting and problem solving told by different actors is an interesting aspect for user involvement [9]. Schön argues here that a conflict depends on various views that to understand the users, views may change a problem description entirely. In this context, one can argue that the user should already be actively involved in early design phases (framing the problem).

Design as semantic construction: Klaus Krippendorff's concept grounds on social constructivism and a linguist paradigm, i.e. the possibility of genuine descriptions and interpretations of the world by language. Social constructivism assumes that individual knowledge and social knowledge are identical, culminating in the "social construction of meaning" [10]. As design theorist, Krippendorff puts a lot of emphasis on what artifacts mean to the people affected by them (design semantics). For him, design "brings forth what would not come naturally (...); proposes realizable artifacts to others (...) must support the lives of ideally large communities (...) and must make sense to most, ideally to all who have a stake on them" [11]. This human-centred approach opens, among others, for a discussion about relationships between professional designers and the network of users they cooperate with. Even if Krippendorff's concept invites for interpretations of fictional users it includes the possibility to initiate a collaborative process, which strengthens communication between designers and users.

Design through user innovation: Ernst von Hippel's two holy conceptual cows are democracy and innovation. The first relates to a liberal capitalist democracy: "Democratization of the opportunity to create is important beyond giving more users the ability to make exactly right products for themselves. As we saw in a previous chapter, the joy and the learning associated with creativity and membership in creative communities are also important, and these experiences too are made more widely available as innovation is democratized" [12]. The second concept 'innovation' means a new idea, practice, or object perceived as such by an individual, a group or an organization. The current economy relies on the idea to apply innovative knowledge and practices for production purposes, which emphasizes their

commercial character and focuses on a progress that confirms certain principles about what is 'good' and 'useful' and what is not [13]. Von Hippel's democratized user innovation approach focuses on a design process in which the users themselves do part of the innovation within a set environment. The starting point is to employ skills and languages they already know and the users' role is to be design 'team members'. As professional designers, users are supposed to experience trial-and-error cycles when designing a product. The experienced consequences of the design choices facilitate, according to von Hippel, more precise design decisions, increase users' creativity and lead to better products. Thus his advice: "Managers in user firms … need to learn how their firms can best carry out development work in their low-cost innovation niches: how they can best deploy their information-related advantages of being actual users and residing in the context of use to cheaply learn by doing. Managers in manufacturing firms will want to learn how they can best play a profitable role in user-centred innovation patterns when these play a role in the markets they serve" [14].

2.1 A summary of the users' role in the concepts

A concept that assumes participation as mainly rational and discursive activity (Simon, Krippendorff) leads to seeing users rather detached from in-situ creative involvement in the design process. Users are either as perceived as abstract (approachable via statistics, behaviour studies, or stereotypes) or as fictional (approachable via personas-, scenario-, narratives methods). Concepts that focus on individual understanding, inclusion and expertise (Schön, von Hippel) imply on the other hand, in-situ engagement with users and their experiences. The challenge for the first concept group is to realize the life-worldly fundament of users as well as of designers experience and for the second to acknowledge that even the most individual experience may under certain circumstances give access to phenomena of a truly shared character. Keeping the concepts, in mind the following section examines methodological consequences of the concepts for design curriculum.

2.2 Methods derived from the concepts

Figure 1 illustrates different levels of user involvement as introduced to the students in the Master Course in Sustainable Design.
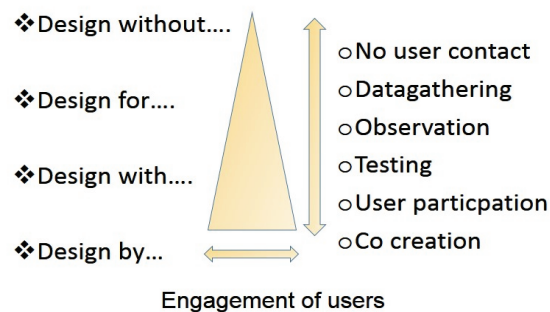

Figure 1. Levels for involvement of users

In principle, the students were free to use any kind of information and method from data/document analysis, via persona development to interviews or focus groups.

Information type and data colection	In-situ and fictional	Abstract and symbolic
Physical, environmental	personal experience with relatives, interviews	survey of consumer behavior
activities	interviews articles, stories, movies, metaphors	Statistics on consumption
intellectual	literature, novels. movies	Reports governments NGOs
social	interviews, literature	survey of social situations, statistics
ethical	Interviews, codes of conduct	
aesthetic	Users in media, presentation of existing products	Formal aesthetics
specific	Individual tests, interaction with products and services	Environmental and technical reports, LCA Existing product development

Figure 2. Information and data gathering

When introducing the methods, we also touched their conceptual backgrounds, but the focus was to apply them for the course assignment. Before coming to the overview of the course and the appraisal of the students groups' works in section three, I will shortly present them. *Data/document analysis:* The main approach here was Life Cycle Assessment (LCA), which is familiar to the industrial ecology students. LCA estimates energy and material impact data of products from resource extraction to recycling and attempts to improve the product performance. *Persona Development:* Personas are fictional characters that represent the needs and goals of users in a nutshell. A persona is a user for whom the product/service is designed. Personas usually comprise the following information: A *personal profile* including age, gender, education, hobbies, family, socio-economic group, special characteristics and so on. A *role, which* relates to a function or professional position, for example for work-centred or home-centred solutions. A *background-story* consisting of a narrative past and a set of facts for example what house the persona lives in, where parents/kids live, where they went on their vacations, etc. [15]. *Interviews and Focus Groups:* The student groups chose semi-structured interviews with an open framework and used the results to identify interest areas for the concept development. Two student groups used focus groups to test their solutions and collaborate further with the users.

3   THE COURSE AND THE IMPACT OF DIFFERENT USER INVOLVEMENT METHODS

Sustainable design (TPD4145/5100) is a course given at the Norwegian University of Science and Technology. During the academic years, 2013 and 2014 we employed user involvement methods in teaching and learning activities and made it part of the students' assignment. The course is for 3rd year students from both design and engineering with a large proportion of international (exchange) students- it exists since 2007. It consists of 30-45 participants, who are divided into 4-6 groups with a main assignment that they chose themselves from the overall topic: Sustainable household practices. Historically, the course has introduced students to industrial ecology, design for the environment, life cycle assessment and other technical starting points to reduce detrimental environmental effects by e.g. reducing energy consumption or waste management etc. However, an ambition had been to expand the focus of the course from technical starting points towards sustainable practices, the inclusion of different user perspectives in eco-design, and the consideration of alternative framings for the problems be addressed. Behind the 2012 revision of the course was an ambition to make students capable of addressing a wider range of issues, and deliberately engaging with problems differently by taking on users' perspectives for problems and solutions in 2013, and addressing these through designing either a product (A), a service (B) or an information system (C). Looking at the results, the most popular method was fictional user involvement, namely persona development backed up by surveys and, in one case, semi-structured interviews. Two student groups had chosen to analyze and improve the material and energy impact of the product. One group worked with in-situ user

involvement in form of focus groups - their concept highlights the communicative experience of the user. The three following examples illustrate in which way the single projects applied user involvement methods.

The charger: The students group dived quickly into the details of the main product. The material focus brings recycle solutions for diminishing the amount of energy, however without taking into consideration other polluting parts of the products life cycle or change of charging habits. The product improvement was good but incremental.


The grocery solution
This was a project in cooperation with a supermarket. The solution was user oriented methods were interviews and surveys. The solution was little pleasing aesthetically and could have benefitted from in-situ user feedback.

Loop
Webpage for lend, borrow or swap items within a limited geographic area (students houses in Trondheim). Great deal of direct user involvement by interview focus groups and testing, this is the students' own user group.
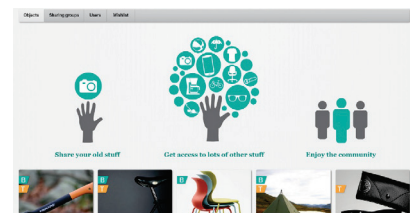
4   FINDINGS AND OUTLOOK

What kind of knowledge is important for designing for and with users? From the author's point of view, methods for user involvement cannot be unified but one should be able to select from a fundus of different approaches according to theory- and practice-tasks at-hand. For example, the greatest benefit of abstract user involvement is that one can determine parameters and validate concepts with help of deductions from theories or by using quantitative, empirical data. One pitfall is that these methods do not allow interpreting human behaviour and activities in-depth, especially not by students whose theory background is rather limited. This disadvantage makes concepts/solutions based on abstract user involvement suitable for incremental changes but, from author's perspective, abstract user involvement does not contribute to create innovative concepts for sustainable design.

According to Long [16], who tested student groups working with and without personas in product development, personas strengthen their focus on the end user, their tasks, goals and motivation. Persona development introduces new ways of thinking to the students that prepares them to consider stakeholders to a higher degree. It also contributes to ensure that everyone in the group is aiming at the same user. One of the most challenging tasks for the student groups in the course was however to make personas that did not resemble themselves. Further some personas designed by the students were so flat that were dropped altogether - persona drawing requires experience and practice. Using personas in sustainable design curriculum are nevertheless a 'golden midway' between abstract involvement and real user involvement. Personas drawing could be supported by other creative techniques as well such as scenarios, and back-forecasting techniques.

Involving real users in workshops etc. is time-consuming but has the best effect in teaching the students not only facts and methods but also in fostering their active role in the learning process. Despite this value, involving real users is a challenge, especially in end-phases of projects e.g. in terms of how to evaluate and 'translate' users' suggestions into design concepts. A practice oriented co-design approach [17], which involves users already in the situation/problem definition phase and keep them immersed through the whole design process, could contribute to make conversation *and* goal definitions easier.

In summary, user involvement is in any form important for design curricula for at least two reasons. First, when designers meet future sustainable design challenges a systemic approach is required that integrates different disciplines and stakeholders [18] second, because future practitioners should be

able to communicate with their surroundings - not only instrumentally about what is possible to achieve and how, but also ethically about what is worth to achieve and why [19].

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