Teaching contextmapping to industrial design students

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Abstract

In human-centred design, design teams need information of user experiences in the fuzzy front end of the design process. This paper presents a review of five years user-centred education in the mainstream industrial design engineering curriculum. We present the way contextmapping is taught in various courses of the mainstream industrial design engineering curriculum (Bsc and Msc), and discuss our lessons learnt during these years in teaching design students to design innovative human-centred products.

Introduction: understanding context for design

The past three decades have shown a shift toward increasing involvement of end-users in the design of products meant to serve them. In the 70s and 80s, designers could restrict themselves to 'packaging a technology, and enabling it with buttons'. In the 80s and 90s understanding the user became a driving force. Since then, more and more information on the user-product interaction was needed, involving the various layers of the context of product use. Figure 1 illustrates this widening of attention. Because many of the extra insights into the experience of product use can (only) be found through the people who live that experience, a range of ethnographic and participatory design techniques has been developed to inform the design process (Sanders, 2006).

Figure 1. As the scope of designers widens, user insights and contextual insights are taken into account in designing. The pictures illustrate two classic surprises for designers: the user doesn’t operate the product ‘as intended’, and the product functions in a complex environment in which it is only one small cogwheel in the works.

In this paper we relate our own experiences in teaching such methods in a large university-based school for Industrial Design Engineering. Over a period of five years we have explored teaching contextmapping theory and techniques to design students in the fuzzy front end of design, in close cooperation with departmental
research and industrial practice. At this point we have arrived at a point where a clearer picture is emerging, although, like the field, it is rapidly evolving. In this paper, we present the goals, techniques and ours experiences in teaching human-centred design research methods.

**Contextmapping**

We use the term *contextmapping* to describe the process of informing design teams about the users, their environments, their needs, wishes, and experiences. This information is multifaceted and in principle infinite in amount, so the scope of what should be included has to be determined for each design project individually. Moreover, the traditionally established sources (e.g., theories of perception and human factors, demographic statistics) are often too abstract and general to provide sufficient information, and sufficient inspiration, for designers in the early phases of idea generation and concept development.

We chose the term *contextmapping* to express a cartographic metaphor, as shown in Figure 2. The task of this type of research is to provide the design team with actionable information by which the team can negotiate the terrain of the user’s experience. But a map need not be a complete and definitive theory to replace the interaction with the terrain; it is a guide, showing opportunities and traps, evoking new questions and pointing out blind spots (‘terra incognita’). On the one hand, design problems are too complex and multifaceted to be captured in a single, complete, theory. By its very nature, design has to deal with ambiguities and contradictions; design tools and techniques should be flexible to support this complexity and ambiguity.

On the other hand, usable information about the users’ experiences does not come in a well-structured, single paradigm. Experiences always depend on the person and situation involved. A map to these experiences, and sufficient leads towards its interpretation, often proves more valuable than a seemingly complete theory that operates only within a narrow perspective.

In constructing such context-maps, the researchers (who can be or can include designers) have to go into the field, developing these insights with the envisioned end-users, deploying methods such as generative tools (Sanders & Dandavate, 1999) and cultural probes (Gaver et al, 1999). Also through the map metaphor we emphasize communication techniques to move beyond *informing* the design team, to *inspiring* them, and helping them *empathize* with the user.

Figure 3 illustrates a basic form for a contextmapping process, involving users, researchers, and designers over an extended period (for a detailed account, see Sleeswijk Visser et al, 2005). Before the participating users are involved, the topic of the study is chosen, and researchers document their preconceptions. They then create a set of exercises, workbooks, and photo assignments, which are given to the individual participants. The exercises and assignments are intended to help the participants self-observe and reflect on their experiences. Participants carry out exercises in a ‘sensitizing’ period of one or two weeks, and then are brought into contact with the researchers in the form of a peer group session or interview. In the session, their knowledge (which grew through the sensitizing period) is brought out in creative expressive tasks, such as making expressive collages, and discussing these. The resulting data (workbooks, photos, collages, transcripts of the discussion)
are then analyzed and communicated to the design team, that uses this information to create new concepts for products and services in the topic area.

The above description makes discrete divisions between process steps (preparation, sensitization, ...), between roles (designer, researcher, user, ...), and between the nature of activities (design, research). But in practice, especially in smaller design practices or smaller projects, the boundaries are less clear. Besides, such divisions are not desirable. In larger companies where these divisions are very real, they form barriers to successful communication. One tries to have designers, researchers, and users work together as intensively as possible; but often, issues of cost, ability, and commitment make it difficult to achieve such an intense collaboration.

![Figure 2. Elements of the map metaphor that fit the domain of design research.](image)

![Figure 3. Upper: the contextmapping process consists of a sequence of steps, each having design and research elements in them. Lower: sensitizing workbooks, collage-making in a generative session, on-the-wall analysis, and person-based insight summaries.](image)
Performing user research in a design process requires an understanding of the roles and skills of people involved, and maintaining a number of balances. The overall aim is to prepare students for human-centered design research. More and more, companies ask for designers with research skills and designers that are able to design for the user experience, next to or instead of technical issues. In the courses, the first aim in our courses is to enable students to appreciate these ingredients, their connectedness, and understand how they can be carried out. The second aim is to provide what theoretical basis there is in communication, qualitative research methods, and design thinking. The aim is not to train all students to follow through the steps in a rigorous manner, as in an experimental methods or a statistics course, but to provide a basis for the 20-40% of the students who choose to develop their skills by applying the methods in other projects.

We have found that it is almost impossible to meet these aims by just lecturing about this. A sensitizing process, associative thinking, qualitative analysis, and finding the right nuance in timing, in ambiguity, and in aesthetics of the materials have to be experienced in order to be understood and appreciated. We prefer to start by giving students hands-on experiences, e.g., of how it is to participate as a user in a sensitizing process and generative session, before we explain the theory behind it. The experience is followed by reflection, theory, and —for those who choose to—experimentation (see Kolb, 1984). But without a taste of the phenomenon, the theory remains a lifeless abstraction.

In doing this, we sometimes use the factor of scale to our advantage: teaching the course to more than a hundred students at the same time in a relatively short timeframe has the advantage that plenty of material generated by fellow students to confront the other students with good examples. In our experience, some 20-30% of the work made by students who picked it up early can help the other students get the concepts more quickly. With 40 groups of 5 students, there are at least 10 good examples to learn from.

Roles and skills
Understanding and respecting the roles and competences of users, researchers, and designers is essential for working with these techniques. Within contextmapping, the users are regarded as ‘the experts of their experiences’, and treated as such. Research skills are needed to guide the process, to empower the users to realize and express their expertise, to interpret and structure the (sometimes huge amounts of) data that emerge. Moreover, the researcher needs social skills in dealing with users, in managing the process, in facilitating group sessions, or conducting interviews. Gaining skills requires longer training, but recognizing their importance and gaining a taste for it can be achieved in a shorter time.

Design skills are involved in creating the expressive tools (probes, workbooks, toolkits), in conveying the findings in a manageable form, and, obviously, in integrating the findings together with the many other requirements in developing the product concepts.

The people performing these roles can be fully separate, can overlap, or merge. E.g., in a graduation project, a student performs the roles of researcher and designer, in which case much of the communication phase is implicit. In the case of co-creation, the users take part in design activities (Sanders, 2006).
A set of delicate balancing acts

There is a great variety in choices that must be made for any particular design project. The balances are not binary choices, but represent a gradual spectrum. On this spectrum a position must be chosen, and a form found that fits all members of the design team. This question has both practical and fundamental implications.

a. between informal and formal methods
   On the formal end are the engineering disciplines and classical human factors training, in which an established theoretical framework allows for specification of constraints, goals, and measurements. On the informal end are the arts academies, which lay great store on the individual development of their students, and their ability to build completely new frameworks, as in the original cultural probes studies (Gaver et al, 1999). In the middle are semi-formal methods and techniques for industrial design engineers.

b. between information (validity) and inspiration (actionability)
   Traditional research and design disciplines have quite different cultures, with different priorities, needs, and values (ref. Sanders 2006; Crampton-Smith, 2006). For instance, researchers lay great store by reproducibility, precision, and validity of their results. On the other hand, designers often feel that ‘research reports’ are too abstract, give them no feeling or empathy for the target group, and provide no basis for idea generation (Sleeswijk Visser et al, 2005).

c. between finding questions and finding answers
   Research is often presented as a method for finding answers; questions are supposed to have originated spontaneously. But design problems are rarely this straightforward (Buchanan,1995). Finding good questions, identifying interesting dimensions, is as much a part of research as finding answers, especially in the fuzzy front end of product development. This type of research suits designers, who are used to entering as yet uncharted territory (Schön, 1963).

d. between ambiguity and precision
   Generative techniques rely on associative and metaphorical thought. Challenges must be sufficiently ambiguous, so that the participants can surprise the researcher with their answers, such that new answers, and new questions, are learned. Managing the level of focus and ambiguity is a design skill required for doing this type of research, one that is often new to researchers trained in posing questions unequivocally so that meanings of answers are well under control.

e. between empathy and understanding (stepping in and stepping back)
   The design team needs to ‘stand in the user’s shoes’, in order to evaluate and guide their own ideas about products. But feeling is not enough. Many other ingredients must be managed (technology, business, production, ...). Throughout the design process, the designer has to ‘step into’ the user’s perspective, and ‘step back’ to regain the outsider’s overview.

f. between quotation (raw data) and interpretation
   In communicating the results of a contextmapping study, the balancing act is between showing raw data in the form of quotes and materials from the study (to support empathy) and showing interpretations of the data. This involves analytical skills and judicious use of verbal and visual communication.
The courses and audiences

In the past five years, we’ve taught the above ingredients to different audiences in a variety of courses. In each we put the emphasis on establishing a sensitivity for the balances, giving a taste of the process, and providing an appropriate amount of (emerging) theory which is actionable for the audience. We see the courses as a starting point for the further self-development of the students, not as a complete training.

A coarse course context

Since the early 90s more and more student graduation projects and Ph.D. projects in our school have been employing and exploring contextual inquiries, cultural probes, generative techniques, often in projects carried out for large multinational companies in the digital electronics and software business. When our school restructured its BSc and MSc programmes, the time was ripe to extend the attention for factors of emotion, experience, and context. These courses draw between 100 and 200 students a year, and provide a first encounter with user experiences for the BSc students, and a deeper background and methodology for the MSc students. Apart from that, we continue to develop the methods in individual graduation projects and small-scale elective courses.

In the meantime, and partially through our students, the methods are finding their way (slowly) to larger and smaller companies, professional associations, and other design schools in the Netherlands and abroad. Through a variety of guest lectures, short workshops, and even 15 minute exposure trainings, we try to provide these particular audiences with a practical understanding and a theoretical basis, always including some form of hands-on experiential component (see Table 1).

<table>
<thead>
<tr>
<th>audience</th>
<th>course</th>
<th>aim</th>
<th># Students</th>
<th>Time in period</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc</td>
<td>Designing for rituals</td>
<td>First encounter, design communication</td>
<td>200</td>
<td>40 hours in 4 weeks</td>
</tr>
<tr>
<td>MSc</td>
<td>Context &amp; Conceptualization</td>
<td>Basic theory, process, roles, steps, practice</td>
<td>180</td>
<td>80 hours in 3 months</td>
</tr>
<tr>
<td>Flanking projects</td>
<td>Diverse design &amp; research projects</td>
<td>Develop skills and apply in context</td>
<td>25</td>
<td>2 consulting moments</td>
</tr>
<tr>
<td>Elective</td>
<td>Rich Visualizations</td>
<td>Design/research project on communication</td>
<td>15</td>
<td>80 hours in 5 months</td>
</tr>
<tr>
<td>MSc</td>
<td>Individual graduation project</td>
<td>Develop skills and apply in context; explore and adapt techniques</td>
<td>12</td>
<td>4 consulting moments in months</td>
</tr>
<tr>
<td>PhD project</td>
<td>Individual research project</td>
<td>Develop new tools and theory</td>
<td>2</td>
<td>Fulltime for 4 years</td>
</tr>
</tbody>
</table>

Table 1. An overview of various student courses on contextmapping
The Bachelor course ‘designing for rituals’
For most of the BSc students in our school, this is their first encounter with observing user experiences, and taking user experiences (instead of technical opportunities or identified problems in a current product) as the starting point for a design. Students work in groups about a given ritual, e.g., getting up in the morning, having dinner together, watching TV, ... In weekly meetings (see Figure 4), each group presents successively (i) the results of their field research (interviews, observations), (ii) ideas for a product improving this experience, and (iii) a single concept for a product. Very little theory or instruction is provided, and each group receives 15 minutes of feedback on their presentation from a pair of tutors. Students also evaluate the work of other groups. With 40 groups, there is plenty of opportunity to compare, discuss, and learn from others.

Figure 4. In a ‘rituals’ poster presentation, groups of students present their user research simultaneously in a public marketplace situation.

The Master course Context and Conceptualization (C&C)
We teach contextmapping as a required course to Master programmes specializing in strategic design and user-centered design. Other design students can take the course as an elective. As a basis we expect students to have had an introduction to user-centered aspects of interaction design, such as Preece et al. (2002).
In the Master course, we provide more depth about specific techniques (e.g., mindmapping, sensitizing workbooks, generative sessions, qualitative analysis and communication), and background theory (e.g., associative and logical thinking, visual communication, participatory design, and research methods). Texts were selected to be actionable, i.e., provide theory, samples, and guidelines which can be applied directly, but also provide hold further study, e.g. Buzan & Buzan’s (2000) or Lidwell et al. (2003). We provide a theoretical foundation for participatory design, and a first taste of some of the new techniques, but leave training and further development of skills to the students and their tutors in later or concurrent design projects.
In the course, students move through the whole contextmapping process shown in Figure 3, starting with a workbook and generative session (see photos in Figure 3), so they can experience the role of the user before they get any theory. Then they assume the roles of researcher and designer (Figure 5). Along the route, lectures and discussions address how to conduct exploratory analysis, make interpretations explicit, and deal with the balances described earlier in this paper. We confront students with each other’s work, and by posing questions such as “why did they get different findings from the same data”, “does it help if a transcript looks boring and anonymous, or if you have been introduced by the people whose words were written down”, “what is inspiring for you as a designer”, and “how much subjectivity is allowed”? These are all questions that are much alive in present research and practice, and on which the jury is still out.
Student projects, workshops, and interactive lectures

The C&C course provides an introductory experience, and many students come back for second helpings, either when they use contextmapping techniques in projects, in one-semester individual graduation projects, or in special research elective projects focusing on some issues. At this level we learn as much from the students as we teach. One example was the *Rich Visualisations* elective, in which 15 students dove into the theory of communicating user experiences with personas, documentaries, and storyboards, and developed evocative communication tools. The tools were evaluated in an idea generation session with teams from a major design department in industry. This way we feed back our findings into industry, and everybody learns from the confrontation.

Moreover, because the students possess basic knowledge and skills, teaching takes the form of consultancy, supported by a website (http://www.contextmapping.com/) with research results and samples of earlier assignments, workbooks, and reports.

Finally, we explored using dramatically reduced forms to give a taste of the processes, such as half-day workshop and a 15-minute generative mini-exercise, which is just enough to let delegates at a conference experience the ways in which generative tools call on associative thinking and provide a basis to start up an interview (Figure 6).
Many of the BSc students are at first puzzled by the approach: they appreciate the freedom in method, but are forced to let go of the classical design engineer’s approach of ‘make an inventory of problems and find a solution for each one’. They are required to explore issues that are not technical or aesthetic, but affective and social, often for the first time in their career. And they are confronted with the pitfalls of ‘the cappuccino trap’, i.e., creating a glamorized or otherwise stereotyped image of the user, which is so easily drawn from images supplied by the media in advertisement and stock photography.

Several students are thrilled by their widened view of what design is about and that other methods (may) exist. And for some, the penny doesn’t drop, and for them the project holds neither a deeper meaning or a learning experience. In the current revision of our school’s Bachelor programme, user experience, design research, and communicating experiences will be introduced earlier in the programme.

Many MSc students experience the C&C course as an eye-opener, and indicate that it changed their thinking about the relation of design and research, and the roles of users, designers, and researchers. We have also seen a surge in the application of these techniques, and related techniques such as cultural probes. The enthusiasm of the students also put some strain on the staff. After starting off in 2003 as a required course for 60 students in the specialization programmes on user-centered design and strategic design, the course has grown quickly so that this year 120 of these students are enrolled, and a further 60 students take the course as an elective.

Although this seriously reduced the flexibility of teaching, scaling up the sequence of short exercises turned out to go remarkably well.

We found out the hard way that experience precedes appreciation: things as sensitizing and associative thinking must be experienced by the students before they can understand the theory behind it. Early attempts to relate to the theory before showing the methods had met with disinterest and lack of understanding. On the other hand, uncritical enthusiasm can result in hype that waters down the essence and value of methods. About two years ago, there was a period when every questionnaire produced by a designer was labelled as a ‘cultural probe’, in order to be in vogue. Gaver et al. (2004) have criticized the formalized integration of the probe methods in research approaches, arguing that it reduces the design qualities of the approach. Although we largely agree with him here, we emphasize that the range between informal and formal methods is a spectrum which must be explored (and mastered) by designers who aspire to work in a user-centered approach.

Probably the most important thing about participatory design is the mindset. It requires an attitude of commitment to ‘taking the user serious’. We express this by saying that ‘the users are the experts of their experiences’, and that they should be treated as such by both researchers and designers. For designers taught in the old school (and for many researchers brought up within narrow theoretical frameworks and laboratory studies), this is a difficult switch to make. Nonetheless, we see enough enthusiasm coming by to feel that a sufficient reservoir of devoted designers will emerge these coming years.
...and conclusions

Over the past five years that we have developed and taught contextmapping to several hundreds of students, we feel that we’ve found our own balance in how to introduce students to its many facets. Among the successes we count a visible enthusiasm, also from industry, but especially of those design students who had hungered before for a more human-centric approach in design. We also see that in design discussions, the personal qualities of user experiences come to light, and design teams speak ‘as if they knew the users’ rather than merely about functions for a passive recipient of their services. A last conclusion so far is that we see design and research merging in a new skill set of design students, fitting the changing needs of design practice.

References


