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Teaching Participatory Design using Live Projects: Critical Reflections and Lessons Learnt

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ABSTRACT

There are few examples of academic work that describe Participatory Design (PD) and Co-design instruction. This paper presents experiences from four years of teaching a university course on Co-design and PD to an average of 57 students per year. A main part of our pedagogical approach is the implementation of Donald Schön's concept of a reflective practicum, via a mandatory 'live' project that runs for the whole semester. We discuss the potential and challenges of teaching PD and Co-design to large classes using live projects, including how to give students first-hand experience of the whole PD process, how to coach students in collecting and using field data, and what expectations of a Co-design process and its participants are realistic. The paper also examines how PD-related challenges affect teaching PD as an academic subject.

CCS CONCEPTS

• **Human-centred computing → Participatory design.**

KEYWORDS

Teaching; Participatory Design; Co-design; University course; Live projects; Reflections; Analysis; Lessons learnt.

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1 INTRODUCTION

Participatory Design (PD) is used world-wide to approach collaborative design, emphasizing democratic end-user involvement through different types of workshops and a range of other methods [33]. PD projects, method-development in PD, and novel trends in the PD research community are frequently explored at major conferences such as CHI, CSCW, and PDC (e.g. [12, 24, 26, 32]). However, the existing literature is noticeably lacking in publications concerning teaching PD. There are papers that may be considered part of the 'teaching PD' category, for example, explaining how to conduct specific PD methods, such as different types of workshops. However, few papers actually address how we teach PD and Co-design as part of an academic curriculum. Hecht and Maass's notable contribution mentions the participatory design community's lack of discussion on course concepts and teaching approaches for PD [20]. In their work, they call for contributions on how to teach the next generation of designers. We hope our paper fills parts of this gap, as it differs from the current, limited body of work on teaching PD (see the Related Work section) by including lessons learnt and reflections from developing and teaching a PD course over several years, with a mixed theoretical–practical content. An average of 57 students take our university's Co-design and PD course every year. As a mandatory course with many students, its instruction differs significantly from studio-based teaching with few design or Ph.D.-students. Our teaching approach involves small PD projects conducted in groups as the backbone of the learning process, and theoretical lectures alternate with hands-on exercises to support the project.

This paper reflects on two categories of PD teaching concerns, especially for large student populations; those related to 1) course context, mainly because the learning situation is set up as an academic course, and 2) learning PD, that is, challenges faced by anyone learning PD, regardless of their learning situation.

Our use of 'live' projects, a tool frequently used in teaching architecture [27], is of particular interest. In our vocabulary, live projects are set up in real-world settings with real stakeholders, and with participants with a real stake in the issue of design. However, the live projects are also designed to allow for a fruitful learning situation, differentiating them from larger, 'real' projects. For

example, a live project will include only a limited number of different stakeholders, reducing the project and Co-design complexity while allowing the students to face challenges and opportunities related to participant recruitment and commitment, workshop design, scheduling of activities, and data analysis. Our paper also describes how the course has evolved based on formal course-evaluation feedback, our experiences and interactions with the students, and the nature of the projects the students have engaged in as part of their learning activities.

We now present the methods used to develop this paper, the authors' theoretical perspectives related to teaching PD and Co-design, and related work. After that, the course context and content are described, followed by two sections that discuss teaching concerns related to course context and learning PD. The paper ends with a combined final discussion and conclusion.

2 METHOD

The paper builds on the authors' experience from four rounds of jointly teaching a Co-design course at the same university. Two of the authors have been part of the teaching team during the last four implementations of the course (2014–2017), whereas the third author joined the team in the second round (2015–2017). The data collection has not been systematic for all four years, but we have course results, formal course evaluations, and student reports from each course round. As we developed the idea for this paper, during the current course (Fall 2017), we added data collection specific to our research, including a diagnostic test to screen acquired knowledge, and video recordings of student groups presenting results from project design encounters.

Table 1. Number of students and groups for each year.

YEAR	NR OF STUDENTS	NR OF GROUPS
2014	48	10
2015	64	13
2016	61	11
2017	54	9

An average of 57 students have followed the course each year (see Table 1). The students are co-taught by the authors, and each group has one of the teachers as main supervisor. Each group is directly supervised at least three times by one of the authors, and all the groups present their work to all three teachers and the class in two 'super-supervisions'. Two of the presentations from the 2017 course were video-recorded and analysed by the authors. For this paper, the authors have revisited course evaluations, student reports (where the students describe and reflect on their Co-design projects), and notes from oral exams and supervision. Each year's experiences and the lessons learnt have helped the authors to understand how the course developed over the years. The authors have used materials from the video-recorded presentation, the student reports, supervision, and the oral exams to analyse the experiences of teaching Co-design, especially in large classes. The presentations (also called super-supervision) and the supervision sessions have given the authors particularly rich insights into the questions that the students face in their live projects, and also into how they react to, or interpret what they are taught. The analysis of this material examines broader themes and specific cases, which are explored below under two main headings: teaching concerns related to course context (section 6), and teaching concerns inherent to learning PD (section 7).

3 OUR THEORETICAL PERSPECTIVE

Our course is called 'Co-design and Qualitative Methods', and its main focus is Co-design and Participatory Design (PD). In the course, the authors do not distinguish between the terms 'Co-design' and 'Participatory Design' beyond mentioning, as a historical and field development note, that in many ways Co-design applies the traditional PD methods and mindset, and that today, the two approaches to design are tightly intertwined. But we also note that differences do exist, for example regarding reasons why users and other stakeholders should participate in design activities, from a political perspective. When teaching Co-design and PD to our students, they are both exposed to a set of methods (e.g. Future workshops [23], Telling–Making–Enactment [9], and Doll scenarios [19]), and lectured on the history of PD and the shift from knowledge production to active participation, through projects such as NJMF [28], Utopia [10] and Florence [6]. The students are also taught some more recent PD concepts, such as Infrastructuring [14, 29] and the roles of negotiation, conflict, and other elements of Co-design [7, 18]. In all, these diverse perspectives enable the students and teachers to discuss and reflect on how to execute PD and Co-design, how and why some design encounters do or do not work as planned, and question what we design, whether it is a device, a work practice, or participation in society at large. Also, as PD and Co-design are no longer restricted to the workplace, we read and discuss literature concerning topics such as why those who are not paid for, or professionally invested in, a design outcome should participate in Co-design work [17].

As noted above, PD and Co-design's approaches to collaborative design work form an important body of knowledge. As Bødker et al. note, when reflecting on the legacy of early PD work, 'one strong goal was to "give the end users a voice" in design and development of computer support in workplaces, thus enhancing the quality of the resulting system. The "secondary result" of Utopia, the methodology, with ingredients such as low-tech prototyping, early design sessions with users etc, has had great impact on IT design in general.' [11, p. 1]. Indeed, in a course with a significant practical component (i.e. the live projects) one must pay attention to 'the methods' of PD. Still, PD and Co-design are so much more. By going beyond the practical methods (e.g. how to do different workshops), and by contextualizing PD in both a historical and a 'where, how, and with whom do we perform PD?' perspective, the students can (we hope) learn both a set of methods, and, through their experiences, reflect on how, why, and from what position they and their project participants and other stakeholders engage in Co-design work. Although students often begin the PD process with the idea that 'people just like to help out', they tend to soon realize that people will not always buy into their ideas (and

indeed, why should they?); people have different agendas and motives, do not keep agreements, or for one reason or another, simply opt out of an activity partway. For those who regularly do Co-design work, these situations are neither new nor strange, but a reality one must navigate. Together, the live projects, the lectures, and the supervision allow students to experience different perspectives, and to discuss participants' motivation, motives, and so on, for engaging (or not engaging) in Co-design work.

3.1 A constructivist perspective

Our pedagogical approach is grounded mainly in constructivist learning, and particularly Donald Schön's concept of the 'reflective practicum' as a context for learning [31]. Schön's epistemological position is that in most situations, the professional practitioner acts on judgement deeply grounded in experience, rather than analytic rationality. He suggests a pedagogical model that draws on the type of 'apprenticeship' found in art, design, and architecture education: 'Perhaps, then, learning all forms of professional artistry depends, at least in part, on conditions similar to those created in the studios and conservatories: freedom to learn by doing in a setting relatively low in risk, with access to coaches who initiate students into the "traditions of the calling" and help them, by "the right kind of telling", to see on their own behalf and in their own way what they need most to see' [31, p. 17]. Schön also uses the term 'reflective practicum' to describe a learning context that resembles reality, but contains fewer of the demands, risks, and distractions that characterize real practice. In such a practicum, students can learn professional practices by engaging in them in a real project conducted under competent supervision. An important part of this is that students must learn to 'recognize competent action' in Schön's terms [31], in other words, by reflecting on the example at hand, to try to understand the reasoning behind our suggestions, and based on this, build an understanding of how they can develop their competence.

We consider Schön's epistemological position highly relevant to teaching PD, as we view PD practice as based on judgement, design skills, and experience, rather than analytic rationality. Each design move in the PD process, such as planning a Co-design workshop, requires the designer to select and adapt appropriate methods and techniques, based on judgement and experience, rather than abstract analysis. Consequently, there is no universal design method, only toolboxes of methods and techniques that are applied [9], which contribute to developing design experiences.

4 RELATED WORK IN TEACHING PD

The need for teaching PD in computer-related education has been noted in earlier research, but the articulation of this need has changed over the last twenty years or so. Looking back two decades, earlier research mentions a need to teach PD to enable computing professionals to build a better understanding of users, but the actual content of the teaching was far from state-of-the-art in PD, even at that time. Kautz argued for user participation and PD in computing education, because 'computing professionals have to be prepared to meet not only technical, but also organizational, social, and political challenges' [25, p. 281]. Similarly, Weinberg and Stephen report on a curriculum development project [34], where a HCI course based on Contextual Design [3] was developed. The purpose was to educate computer science students in techniques that 'embrace the human activity as an integral component of the analysis, design and evaluation' [34, p. 238]. Later research describes newer modes of PD instruction. Hecht and Maass note the participatory design community's lack of discussion of course concepts and approaches to teaching PD, and called for contributions on how to teach the next generation of designers [20]. This call led to some debate in the field, and workshops set up to discuss the subject and share experiences of teaching PD.

4.1 Different teaching perspectives

The existing contributions to the field of PD teaching reflect different perspectives on teaching and learning, but lately, various takes on constructivist learning seem to dominate. From a non-constructivist perspective, Hecht and Maass describe a PD course that presents the history and general ideas of PD in Europe and the US, and present a number of methods in detail, with exercises, but the students have no contact with real users [20]. The rationale behind this mode of teaching is that the students in the programme in question are used to learning well-defined methods, and are eager to learn 'clear-cut "recipes" that tell them exactly when and how to use a method' [20, p. 168]. From a very different perspective, D'Andrea and Tell describe a didactic situation where their teaching of a PD course is framed as a PD project in itself [13]. They argue that the structured, institutional context of the origins of PD differ from the teaching context of their course, with regard to the balance of power among stakeholders, in their case, the promoter of the project/course, the users/students, and the designer/teacher. We find this interpretation inspiring for our own work, as we have observed that the power relationships evident in our students' live PD projects are much different from those in the PD projects in our research. Our roles as supervisors and teachers create a power relationship with them as designers that has no counterpart in typical PD projects. The particular teacher/students relationship clearly affects the PD process in various ways that are reflected in our observations. In more recent research, constructivist learning seems to dominate and Andrews et al. describe a conference workshop on PD teaching, where all eight organizers, representing five learning institutions, subscribe to constructivist learning [2]. They begin by describing three key aspects of teaching PD: (1) increasing students' ability to do PD; (2) the need to both be familiar with theory and engage with actual PD facilitation practices; and (3) the need for teaching PD in a richly participatory way, built on a sound theoretical background, or learning through participation'.

4.2 Using live projects

The use of 'live projects' in teaching is central to our discussion, something that relates strongly to a constructivist learning perspective. Live projects are commonly used as tools when teaching architecture [27]. Various definitions exist, and other terms are also used. According to the *Live Projects Network* organization, Live Projects are also known as 'Design Build

Projects', 'Live Build Projects', 'Real Projects', and 'Service Learning' [1]. One definition of a live project is 'a type of design project that is distinct from a typical studio project in its engagement of real clients or users, in real-time settings. Students are taken out of the studio setting, and repositioned in the 'real-world…' [Sara, 2004, according to 27, p. 1]. *Live Projects Network* presents a slightly more elaborate definition, 'the negotiation of a brief, timescale, budget and product between an educational organization and an external collaborator for their mutual benefit.' [27]. The project must also be 'structured to ensure that students gain learning that is relevant to their educational development' [27].

We have adopted the 'live project' in our PD teaching, as a tool to implement Schön's notion of a reflective practicum, but do not adhere to all details in the definitions above. For example, in the first two rounds of our course, we contacted organizations and defined an overall common theme for the projects, but in the last two rounds, recruiting participants has been the students' task. Also, in contrast to the latter definition above, typically we have not negotiated a brief or budget for the live projects. Our main concern when we set up live projects is that students are allowed to work with a design project in a real-world setting, addressing the needs of, or potential benefits for, participants in the setting with a real stake in the project. As part of the reflective practicum, the live project constitutes a realistic setting where the students learn by doing, but with relatively low risk, as the design task is not commissioned by the stakeholders. During supervision and class presentations, we aim to help the students with what Schön [31] calls 'the right kind of telling'. The student groups present their current problems, and we discuss them and give advice. However, we avoid telling them directly what to do. Instead we invite them to discuss and reflect on possible options concerning the situation at hand, acting as coaches who help them to determine competent action, rather than as teachers.

There are arguments against using live projects. According to Hecht and Maass [20], there are practical and conceptual reasons for not working with real users or live projects. They found it difficult to find users willing to engage in a project for the eight-week duration of the course, and 'facilitating new methods while being "among themselves" was hard enough for a lot of students' [20, p. 167]. They also focus primarily on teaching practical moderation skills, and claim there is more room for experimentation without real users in this area. In contrast to Hecht and Maass's [20] belief in the need for a more protected learning environment, Andrews et al. [2] state that students should be exposed to uncertainty. In particular, they emphasize the need for students to 'feel lost' as a necessary step towards 'finding a way'. Similarly , Winter and Sharp report on a project where four students from an undergraduate PD course participated in Co-designing a new system in a shop-floor context at a small mechanical engineering company in Sweden [35]. They emphasize the learning opportunity that comes from uncertainty in a live project, reflecting the diversity and richness of real life. Students experienced high levels of uncertainty in this project, but by embracing the difficulties, they learnt to apply and even to adapt the PD methods. This is in line with Schön's ideas about a reflective practicum where a professional practice is learnt [31]. However, Schön also states that a reflective practicum should involve less risk than real practice, indicating that the level of uncertainty in a live project needs to be managed.

5 THE CO-DESIGN COURSE – OUR CASE

Our Co-design course is part of the second year of the Bachelor programme in Digital Media and Design at the IT University of Copenhagen, Denmark, which introduces the students to fundamentals in Media and Communication Science and Interaction Design. This mandatory course is a 15 ECTS course with class instruction twice a week, and it runs the whole 14-week semester. Class instruction consists of two-hour lectures and two-hour exercises, where the students work more hands-on with the lecture topic, or on their individual projects. The course description in the official course base states, 'The course starts with a 2-week 'rapid Co-design' project in 'safe' environments to introduce fundamental perspectives, methods and tools. This is followed by a 9-week Co-design project in real-life context, divided into three similar phases, each with a Co-design encounter in the live setting. Each phase starts with introduction to theory, methods and tools, followed by rehearsing and preparation of the Co-design encounter, under supervision from teachers and TA's [teaching assistants]. The Co-design encounter is then carried out with external participants, followed by reflection on and documentation of the encounter. The phase ends with presenting the Co-design encounter, with video documentation and reflections in class. After the third phase, an exhibition of proposed product or service concepts is arranged by the students for class and external participants.' - [22]. In the last couple of years, the two-week 'rapid Co-design' project has been omitted, so the students may start their 'real-life project' earlier, and they now have approximately 11 weeks for the project before starting to write their final reports (these reports and a group oral exam yield the students' final individual exam marks). The students requested more time to recruit the external group with which they were to work, and omitting the two-week mini-project allows a bit more time for that.

The course description establishes learning goals that describe what the students should be able to do upon completing the course, which guides the exam. The learning goals are:

- define participatory approaches in their historical and societal context, and their relation to other design approaches
- plan and conduct Co-design projects including understanding a specific context, engaging people in this context, and suggest 2–3 product or service concepts grounded in an understanding of the specific context,
- select, motivate, combine, and apply relevant theories and methods for explorative Co-design projects,
- reflect on practical and theoretical aspects of explorative Co-design processes based on experience from the specific Co-design project, and
- communicate relevant aspects of Co-design processes in oral and written form including use of physical Co-design materials, video and other media.

The students work in groups on the live projects, which demand a significant amount of the effort they put into this course. Therefore, 'only' a bit over half the scheduled time slots are used for traditional lectures with exercises. The rest are set aside for 1) project work, where the groups plan, design, carry out, and analyse their Co-design encounters, 2) group supervision with one of the teachers, and 3) mandatory presentations of insights, method reflections and design work based on their co-design encounters, to fellow students and the teachers. The students also have to work on their projects outside the scheduled lecture hours (but with a combined effort corresponding to the course's 15 ECTS). The criteria for the live projects have changed over the four years the authors have run this course, especially in terms of who the students work with in their Co-design projects, and how these are recruited. For the past two years, those who could be recruited and worked with have been restricted to: 'A group of citizens, organization, workplace or project (not friends, family, fellow students, etc.). Examples of partners have been a body corporate for a building, an urban farming association, a city project to support bicycling, a festival and semi-structured groups of runners. It is crucial that the user group (the people you involve) has a real stake in what you are going to design, and that they are not a temporary group of individuals, but people interconnected through for example an organization, association or project.' [extract from internal project brief].

This course evolves every year, as do most courses, depending on the experiences of the preceding year, student feedback, developments in the field, and – as we are a research-driven teaching institution – the authors' recent and current research interests. For example, if we focus mainly on course progression based on what we learnt from previous years of teaching, the case work, and student feedback, we implement changes related to what we define as 'distance to stakeholders', described below.

Particularly during the second year of our course, we noticed that many students had difficulty recruiting participants, so they included friends, family members, and fellow students in their work. This allowed them to do Co-design workshops, but they did not experience the full extent of the difficult reality of doing PD and Co-design activities, especially in non-professional settings, including difficulty motivating people, and having them regard the purpose of a student project as leading to an implementable solution to only a very limited extent. At the same time, the family members or fellow students often helped out, which created situations where the topic of the project came second to trying out fun methods, or was sometimes forgotten. Therefore, we now require students to recruit people that have a potential stake in the topic and their project.

Another overall change in our course has involved the project topics, as these have changed for each year. The topics on which the students have worked in recent years have been 'Social Sustainable City' (2014), 'Pop-up events for exhibitors to showcase their work at an innovation festival' (2015), 'Sensors and the Smart city' (2016), and 'Citizenship' (2017). To support and guide the students' Co-design process, the project requirements follow a structure of 1) initial field studies (referred to as the first encounter) to recruit participants, create interest in their project and obtain insights into the context and people they are going to work with; 2) plan and carry out at least two Co-design activities (referred to as the second and third encounter) with the recruited participants. These could be Co-design workshops, or arranged as other kinds of events, but with a focus on dialogue, co-creation of business perspectives, and an exchange of skill and knowledge among the students and the various participants. Before each encounter, the groups develop and submit a script to the teachers, which describes the planned encounter in detail. After each encounter, the groups process the generated material, and present their project insights, methods reflections, and what they will take with them from the latest encounter to the next encounter they must plan and conduct. There are about two weeks between each encounter, to give the students the opportunity to analyse and reflect on their findings and process. The logic behind the three encounters follows the authors' own Co-design experiences. A series of three encounters, instead of a single event, allows for progression through the Co-design process with the participants, with the steps of discussing (the current situation, making, and enacting (exploring and designing new possibilities) [9]. The series of encounters also means that the workshop participants (incl. the researchers/students) can become familiar with each other – and the 'non-designers' can become familiar with the Co-design methods and the design work. Finally, this also forces the students to set up an encounter more than once, giving them the experience and the opportunity to learn, adjust, and try again.

5.1 The lectures and their content

During lectures, the students learn about the history of PD and Co-design, methods and tools that sustain Co-design activities, how to document and analyse workshop activities and field data, positive and negative aspects of Co-design work, and recent developments and trends in the fields of PD and Co-design. The students are also given numerous examples from different Co-design processes. The examples go from large-scale projects that run for many years, to small events that run for a week. The projects represent both workplace-situated design activities and less controlled settings, such as design in home settings, semi-public spaces, and for and with the public. Although many examples are from contexts familiar to most students, to a limited extent we also discuss project contexts unfamiliar to most students, such as Co-design with informal workers and homeless people in South Africa, and Co-design with adults on the Autism spectrum. Both success stories and less successful examples are presented and discussed, for example why a process worked well in one context, but not in another. Lectures also discuss and exemplify the challenges of facilitation and how to support participation in design work, and cases of participation not being positively perceived by the intended participants. Indeed, although methods are taught in class, an important part of the course is exemplification of how Co-design methods may be implemented and, even more importantly, how Co-design processes may be managed, from the very start to the conclusion. An important takeaway message we try to give the students is that Co-design does not have a binary outcome – success

or failure – especially in a course context. Many methods may be used, participants may be included in many different ways, and although the final outcome is seldom the 'perfect product', much may be learnt from both the participants and the process.

6 TEACHING ISSUES RELATED TO COURSE CONTEXT

Our reflections on issues in teaching PD are divided into two categories: (1) issues related to course context, mainly because the learning situation is an academic course (presented under this heading); (2) issues inherent to learning PD, that is, challenges faced by anyone learning PD, regardless of the learning situation (presented in chapter 7).

6.1 The importance of first-hand experience

The students appreciate working with live projects in a 'reflective practicum', despite the many practical and logistic challenges. We engage students in live PD projects because we believe this provides them with the best learning opportunities. Our aim is to create a reflective practicum where first-hand experience of a Co-design process, engaging real stakeholders, and collaborative reflection with supervisors, forms the core of the learning experience. The design case used in the second year we ran this course supports our observation that the students appreciated the learning situation. In this case, the students worked with an Innovation festival involving 20 start-up companies. The start-ups were divided into clusters based on type of product and market, and subsequently each student group was assigned a small cluster of 2 to 3 start-ups. Their task was to design a pop-up event to promote the assigned start-ups on the main day of the festival. The start-ups were geographically dispersed, for example, one group worked with two start-ups in Denmark and one in Spain. The geographical spread and multilingual setting, the busy calendars of the staff of the various start-ups, and the rather abstract design assignment of creating an event, made the project overly complex. To our surprise, despite the inherent complexity and the many frustrations expressed by the students, this course round scored higher than the others on the question 'I believe this course is relevant for my future profession' in the course evaluation. We believe this indicates how relevant first-hand experience is, even when derived from an overly complex context and project.

6.2 A hard sell

When students approach a potential user group, a fundamental and unavoidable challenge is that the live project is a hard sell; it is difficult for the students to offer the users incentives to participate. This is mainly due to the conditions for setting up the live project that are imposed by the course. The students are required to recruit a user group with a real stake in an issue, around which the students may build a Co-design process. As described above, we ask all student groups to organize the Co-design process around three design encounters. We impose the limitation of three encounters, because in our experience most external organizations cannot commit to much more time. Also, because the students are new to Co-design, they spend a lot of time learning theories, methods, and techniques before they can apply them, and they seldom have the capacity to develop design concepts into more than scenario enactments with low fidelity prototypes. Ultimately, facilitating a Co-design process for the first time has many unknowns and is very complex for the students. Consequently, and quite naturally, the students find it hard to describe the design outcomes the users may expect in exchange for their commitment, making it difficult for the students to persuade users to participate. For example, in one of our courses, the students explored the possibilities of sensor networks in the city, and making use of public data. One student group worked with a bee-keepers' association, and as it was difficult to explain what design results could be expected, the chairman of the association refused access to the bee-keepers' meetings, and allowed them to interview only himself. However, after convincing him of the potential, they did contact other beekeepers, and explored how the weight of the beehives, collected with sensors, could reveal honey production and other types of status information for the beehives.

Students tend to find it hard to meet and manage the expectations of their recruited user group. At best, the students can deliver a design concept, fairly well grounded in user practice through Co-design activities, perhaps expressed through enacted scenarios in the real use context. For example, this is the case with one of the groups in the current course session. They are working with nurse–patient and nurse–doctor communication at the urology clinic of a local hospital, and are developing a concept for local information screens in waiting rooms, with real-time information for patients. The concept is to be handed over to the hospital's local IT department at the end of the project. In many other cases, students find it hard to manage expectations. Although often the design process is ultimately rewarding for the students, and sometimes also for their project participants, at the time of recruitment it may be difficult for students to commit to delivering concrete results.

6.3 Urgency of rapid commitment from participants

The urgency of rapidly establishing contact with a user group and having them commit to spending resources on participation presents a challenge that is firmly grounded in working within a course structure, rather than in a real design situation. This is related to the foregoing issue of 'selling' the project to the users, but we describe it separately, as we have specific observations on very pragmatic issues.

Without some form of commitment from others, the students have neither a project nor any Co-design participants. Therefore, important early tasks for the students in the course are to form a project and recruit relevant participants. Since the third time we ran this course, we have prohibited students from recruiting family members and friends. They may recruit design partners through their social network (e.g. 2nd-order connections, but not direct connections). From the first or second lecture, when the students receive their brief, their attention is directed mainly at identifying potential projects, and reaching out to gatekeepers and key

participants in the potential, identified cases. If needed, as a last resource the teachers may intervene and facilitate projects. However, that had been unnecessary during the last two years in which the students themselves had to recruit participants 'from scratch'. It is easy to understand that the students cannot relax during this period, and much of their out-of-lecture course time is invested in the recruitment process. A notable challenge that many of the student groups encounter is that their potential partners need time to decide whether or not to participate. The challenge of recruiting participants may be familiar to many researchers who do Co-design, especially when working with a topic more interesting to the researchers than to the participants. That suboptimal condition also helps the designer to remember that Co-design is an inclusive approach to design that comes into its own when the stakeholders involved have a strong stake in it, and a need for change related to the subject of the Co-design process. For the students in our Co-design course, the urgency of rapid commitment from potential participants is an important consideration, if not the most dominant concern early in the student's process. They need a commitment from a group of participants or a gatekeeper (e.g. a municipality, organization, company manager) to be available and interested in at least three encounters concerning a specific topic. Two course instantiations ago we suggested that the students 'bet on many horses' early in the recruitment phase. This was simply to not waste valuable calendar time. If, after two weeks students get a 'no' from a group, it may be too late to start again. We now emphasize that they should have up to three case-options running during the recruitment phase, rather than investing all their effort in one possible partner at the time.

We have observed two problems that cause delays in project set up: one concerns communication and planning, and the other concerns negotiation with gatekeepers. Even if the very first contact with a user group indicates preliminary interest, students consistently underestimate the urgency of getting solid commitments to time slots in the user group's calendars. We find that they often email to ask for an appointment, and then wait up to a full week before following up, instead of making a phone call. We suspect that the 'hard sell' the students are asked to make already puts them in an uncomfortable position, and this could be a partial explanation for their procrastination. Organizations' gatekeepers are a second reason for delays in commitment to participation. Gatekeepers may be a valuable asset, introducing students to a site and providing access to users, as reported by Winter and Sharp [35]. On the other hand, someone with power to act as a gatekeeper between students and users will often question the students' project and purpose, and deny access to the users until certain conditions are met. Sometimes, this is warranted; we have had students being (rightfully) denied access to patients at a local hospital on ethical grounds. But usually, this leads to negotiation with the gatekeeper about conditions for access to users, and finding compromises that sometimes lead to severe delays. Both procrastination and negotiation with gatekeepers remain challenges for us, when teaching PD with live projects.

7. TEACHING ISSUES INHERENT TO LEARNING PD

We will now turn our attention to concerns inherent to teaching and learning PD, namely: 1) Creating a 'magic circle', 2) Feeding forward results from encounters, 3) Unrealistic expectations of participation, and 4) Sensitive persuasion.

7.1 Creating a 'magic circle' (with real users)

We argue that experiencing how real users enter a 'magic circle' during a Co-design encounter is paramount to understanding the merits of active participation in PD. Huizinga [21] coined the term 'magic circle' as a classic way to understand games as 'temporary worlds within the ordinary world, dedicated to the performance of an act apart' [21, p. 10]. This term may be used as a shorthand for describing the idea of a special place, enclosed and separate from the real world, created by a game, which is '… a space both limited and limitless. In short, a finite space with infinite possibility.' [30, p. 76]. There is no room in this article to unpack a complete argument for the applicability of this term to describe participation and engagement in Co-design activities (it is a paper of its own). However, we do claim that the term bears on describing students' potential to understand the workings of Co-design engagement from first-hand experience of stakeholder participants entering a creative moment during a Co-design encounter. Similar experiences are described in PD literature, without using the term 'magic circle'. For example Binder describes a kind of moment as something that 'opens a way from the well-known everyday of the collaborators towards the world of 'what if' of virtuality, instrumented and mediated by the collaborative encounter' [4, p. 267].

In our teaching, we strive to create the best possible conditions for 'magic circle' learning experiences to happen, but the live project, being a necessary but not sufficient condition for this type of experience, introduces a high degree of uncertainty. Since we are never present at design encounters conducted by the students in their projects, we have no first-hand observations of how students experience users entering a magic circle. But in class presentations of results from design encounters, discussions with students often indicate that such experiences occur. For example, the students have discussed how using 'doll scenarios' or role-play has moved their participants into the 'magic circle'. On the other hand, we also see examples where students fail to create a 'magic circle' in their design encounters. In a workshop with a user group in a workplace, one group had planned an exercise using doll play to explore the challenges and possibilities in the work life of nurses. The group of students found that the doll play successfully prompted a dialogue. The nurses very quickly started to 'just' talk after a brief enactment using the dolls. However, it was difficult for the students to keep the nurses 'in the enactment' with the dolls. Because of the way it was facilitated, it was very easy – and probably also very comfortable – for the participants to fall back on 'just' talk, instead of enacting scenarios. Winter and Sharp refer to a similar case of weak facilitation [35] when describing how their students failed to maintain control of a future workshop during a live project at an industrial company. In Winter and Sharp's case, the participants

took control of the dialogue, and seemingly reverted to their usual practice of solving design problems through simultaneous discussion and design.

To help to establish magic circles and ideas for the future, our teaching offers concrete examples of how to design and use different evocative tools and techniques, for example, the use of what-if questions, sketches, scenarios, props, and prototypes [19]. It may be difficult to create what-if questions that are simultaneously open enough, and contain an idea that evokes new thoughts of possibilities for the future. This year, one group concluded that their user group was not creative, after a failed attempt with what-if questions. When they later presented the what-if questions they had used, such as 'what if you had an app to organize events', it became clear that the questions caused the problem. The questions did not present any vision, or only a vague one, while also being too narrow, already suggesting specific and very familiar solutions such as an app or Facebook. In summary, when we supervise the students planning a design encounter, we try to make the most of our Co-design experience to help them set up activities that are conducive for 'magic circle' engagement, but the outcome is always uncertain. Also, activities that include enactment, in particular, but also building things, may be uncomfortable for the students themselves, and therefore also uncomfortable to propose to others as an activity. Students sometimes experience lack of faith in these methods, and are anxious about whether the participants will find them 'too silly', but students that have had a positive experience of working with doll scenarios also learn of its benefits. At one class presentation, one student in the audience told a group that had planned an exercise with doll play for a workshop with doctors that, based on his own recent experiences, 'you just have to be confident yourself when you introduce it to them'.

Despite the challenges just discussed, our impression is that it happens often enough for the asset of a positive learning experience to outweigh the cost of uncertainty in outcomes from our teaching. Still, experiencing success and failures with methods and the 'magic circle' first-hand is essential to understanding the merits of active stakeholder participation in design and supports the argument for engaging students in live projects.

7.2 Feeding forward results from encounters

Looking back at the past years' course projects and their design processes, we observe that making sensible use of the material students generate in the encounters they organize with the various participants, is a recurring challenge. From our perspective, the students are uncomfortable engaging with the material they generate, especially between encounters, and letting the results from one encounter feed into the design process, and provide input to the next encounter. The students also tend to see themselves as facilitators of a design process, rather than members of a heterogeneous design team composed by them and the recruited participants. The combined effects of these concerns is that they prefer to not contribute to the design work, especially not without the other participants. They expect the recruited project participants to do all design work during the workshops, under their guidance. Although a Co-design process may benefit from provocations, for example, presenting the material generated at a workshop for the participants in a re-designed way (e.g. intentionally manipulating the data, or moving it into another context), the students are afraid that they will no longer be objective if they engage with the participants and the data in such a way. During supervision we, as their teachers, must constantly encourage them to be Co-designers, and not only facilitators of someone else's design process.

Perhaps as a consequence of the foregoing, the students tend to see each encounter in isolation. It is difficult to get the students to plan, so the outcome of one encounter provides input to the following encounter. It must be acknowledged that the students have not previously gone through a Co-design process, and hence it is difficult for them to 'plan ahead'. They also know that they must do at least three activities with external project participants. As a result, it is difficult for them to learn a process, set up and plan encounters, do design work, and so on, as parallel project (and course) activities. Often, it is important for the participants to experience a continuum between encounters, so they see that their input in one activity has been considered in the subsequent one.

7.3 Unrealistic expectations of participation

The aim of the course, and of Co-design in general, is to involve people with different kinds of skills, knowledge, and interests in a project, to jointly explore the current situation and imagine possibilities for the future [5, 19, 33]. A frequent challenge is how to create situations where the participants feel comfortable while being prepared to take part in the dialogues and design work. Especially related to the latter element, PD has a long tradition of creating design materials, artefacts, and devices, such as props and prototypes, which support the non-designers' participation in design exploration and technological development [8, 15, 16]. In addition to the physical materials and devices, there is also a need for the designers to frame and facilitate the encounters with the other participants, so everyone has the opportunity to participate and feel comfortable doing so.

Creating settings for participation, especially when evoking future possibilities, is challenging. Teaching how to do that includes examples of our own and other researchers' work, with a focus on how to create favourable circumstances for participation. With respect to that, in our last evaluation, many of the students indicated that they generally find it difficult to navigate what is right or wrong in Co-design, or that there is none. As we have previously explained, the students must prior to an encounter develop a detailed script outlining the planned activities, participant and facilitator roles, etc. In their scripts describing the circumstances for participation, we also see a lack of realistic perspectives on time and their expectations of the participants' design and performance capabilities. These scripts have described for example meetings where 3 to 5 different games and exercises are scheduled for 1 or 2 hours, or encounters that include no break, because the planned programme is so tight there is no time for one. With regard to performance skills, there are also examples of introductory games, where the participants must stand before everyone else in the workshop, and tell stories about themselves, or

exercises where the participants must come up with ideas on their own, and draw them as scenarios (without talking to the other participants). These examples create situations that may be uncomfortable, because people are asked to perform before strangers, or to use skills (creating design ideas and drawing) they are unfamiliar with, and they must do it on their own.

For situations such as the foregoing, the general recommendation is to put oneself in the participant's place when planning the exercises, and to rehearse the script before the encounter, to see whether it works, whether the students can do it themselves, and whether the time frame is realistic. In particular, groups that have actually rehearsed beforehand, or have experienced the problem of a lack of time, see the point of a script and the rehearsal, to adjust the planned programme prior to the workshop. However, this mostly touches on the question of time. It is something different when it comes to the question of sympathy, here understood as whether you can put yourself in others place and try to understand how the situation will appear to them. Our experience is that the students overlook or forget this element (or they sometimes overdo it, e.g. create situations that are too cosy and comfortable for everyone), and create situations where the expectations to the participants' creative skills are high. some extent, this is also something that may be caught during a rehearsal before an actual encounter.

7.4 Sensitive persuasion

In PD and Co-design, we as designers may know of workshop methods or other activities that would benefit the design process, but about which other participants may be hesitant, especially at first glance. In a way, one may say that it benefits a Co-design process if everybody has complete trust in the process from the very start. In most cases, when working with participants that do not know you, and have no prior Co-design experience, this is just a utopian dream. To establish trust within the group, and in the methods used, is a process that often takes considerable time and effort. In a course context such as ours, the time the students can invest in establishing trust is limited, and they go into situations where they must balance the level of 'Sensitive persuasion'. Sensitive persuasion is the term we use to express the need to push participants slightly outside their comfort zone, exposing them to new ways of thinking and perceiving the world (as a means to design), but if pushed too hard, participants may reject the activity up front, or, participate once, but never return for the other design activities.

We argue that sensitive persuasion is a crucial element of PD and Co-design. It may be visible to different degrees, based on the process participants, their backgrounds, and so on, but it is a crucial element of PD. There are no tools or methods that define the needed level of sensitive persuasion in a Co-design process, and it differs on each occasion, based on a number of factors (group composition, design methods used, etc.). When there is sufficient time for the Co-design process, the strategy is to start slowly with simple design methods, and invest in team-building and so on. Once trust is established, a team can slowly advance into the world of design and Co-design. This is difficult for trained designers, even more difficult to teach to Co-design students, and as a consequence, very difficult for the Co-design students to manage, especially as they cannot afford to not 'push', given the time constraints of the course. Although it is difficult to formally teach the aspects of sensitive persuasion, the students may experience it. For example, with the use of dolls in so-called 'doll scenarios' [19], we may see that the students see benefits of the method, but also find that some of their participants may be hesitant to 'play with dolls', even in a workshop context. The students must always balance the perceived benefits of a design method (e.g. in terms of useful outcomes), such as doll scenarios, role-playing, or a Future workshops, with how challenging it may be to find the right level of Sensitive persuasion.

8. DISCUSSION AND REFLECTION

In our conclusion we would like to start by returning to the central question of how live projects may be used to teach PD, and in particular, for teaching student groups larger than the typical design school class or PhD course. We do believe that the size of the student group is an important factor when designing a course and choosing teaching methods. To the best of our knowledge, with little data being available, our impression is that many PD courses and teaching efforts target smaller groups, either in studio-based design teaching, or in smaller graduate or PhD courses. Consequently, we argue that participatory design is most often not taught to large university classes, but that may change with a growing interest of PD in IT-related design and the increasing size of university classes due to economic considerations. Therefore we may need to find ways to handle larger student groups when teaching PD. In this paper we demonstrate that we have achieved good results from teaching PD to a large student group. Our general experience from four years of teaching Co-design is that it is rewarding, but that it also presents many challenges. The course unfolds during the third semester of the students' Bachelor education. At this stage of their studies, the students have not yet acquired a broad set of (interactive) design tools and skills. Although the lack of design skills challenges the students to develop mature and thought-through design concepts, to some extent it also allows the students to focus more on the process and activities. The students also know that the emphasis in the course exam is on the process and methods, rather than the design outcomes.

The course we teach engages the students half-time over a full semester, and the students work in groups of 4 to 6 students, so each Co-design project we set up involves a substantial number of work hours. However, we still find it difficult to carry out the projects in about 14 teaching weeks, and it requires three teachers' and three teaching assistants' substantial supervisory efforts. It works, and it is rewarding, but teaching PD is also hard work.

The outcome we find most interesting is that the more prominent issues we have encountered when teaching PD have more to do with the inherent challenges of learning PD than the actual learning context. We have identified issues related to teaching PD that concern course context. The first one is very much in line with later research on teaching PD [2], embracing constructivist learning: the use of live projects rather than

simulating PD in exercises or in-house projects. We have tried to set up a learning situation similar to Schön's [31] concept of a reflective practicum, where students may apply PD methods and techniques in a live project, but with no 'real' stake involved, and under competent supervision. In this way we hope to create a learning environment safe enough for the students to cope with, and learn from the inevitable uncertainties of live projects, and where they may benefit from *first hand experience* of PD. We have also chosen to let the students set up their own projects and recruit their own user groups, within a course theme, rather than preparing projects beforehand. This has the inevitable consequence of the project often being a *hard sell* for the students when approaching stakeholders, gatekeepers, and users. However, we believe that finding their own projects increases the students' sense of ownership. Also, managing stakeholder expectations regarding the end result remain the same, whether or not teachers prepare the projects. The last point regarding issues related to course context is the *urgency of rapid commitment*. The fact that the projects must be conducted within the limited time frame of the course puts pressure on the students, in particular when setting up the project. Hecht and Maass report that facilitating new methods was hard enough for students without doing live projects [20]. We have also encountered a few situations where owing to political issues and strong 'gatekeeping', the students never managed to experience a complete Co-design process with the group with which they established contact. From our experience, we argue that the urgency of rapid commitment from stakeholders also creates a learning opportunity. Exposure to the demands, risks, and distractions of real practice that Schön describes as part of a reflective practicum, although to a lesser degree than in real situations, is necessary to learning the professional practice of PD, a point also made by Winter and Sharp [35]. At the same time, we found that the given structure of 'three encounters', with group-based supervision throughout the course, supports the students in their work of applying Co-design to their individual (and diverse) live projects. These actions help to meet the challenge of teaching a large class, in contrast to omitting the live projects, or presenting the students with only a rigid set of methods to be applied.

As stated above, the issues we find most challenging are those that are independent of the practicalities of a university learning context, and instead inherent to learning PD practices. Creating true engagement in design encounters, where participants can enter a *magic circle* [21] and new design openings can unfold [35], is essential in learning PD practice, and this is where we see students struggle the most. They are often incapable to sustain the design activity at the required level necessary to make this happen, and fall back on the weak participation described by Winter and Sharp [35]. At the same time, perceiving 'magic circle'-like engagement is arguably one of the most important first-hand experiences when learning PD practices, to understand the merits of active participation in design. Furthermore, understanding the connection between the chain of design events, and other design activities that typically make up a PD process, is another area where we find live projects essential. In contrast to magic circle engagement, which may be difficult to achieve even for experienced designers, *feeding forward results from one design encounter into the next* is achieved by careful analysis, deliberate reflection, and making sound design decisions. In our experience, this is an area where students consistently have underperformed in the course implementations we have observed. Our immediate reflection is that we have focused too much on the individual methods and techniques, and less on how they function in concert, and perhaps how one instance of using one method may feed into the next instance of using the same method. Regarding *expectations of participation* and the practical planning of participatory design events, our experience is that students find it very difficult to set up a realistic time frame for a participatory design workshop, for example. It may be possible to address this through exercises, but still we believe that a live project experience, where failure has real consequences for the ongoing process, is a better learning experience. Finally, we use *sensitive persuasion* to describe gently pushing participants towards or past the edge of their comfort zone, when introducing them to new thinking and design methods. Our experience is that this is very difficult to simulate through exercises, and the live project experience is essential for learning.

We believe that our teaching has yielded useful insights that are worth sharing, and we have presented them in this paper to contribute to the debate on teaching Participatory Design. However, there is room for improvement, and we have identified elements of our course that would benefit from further development. First, we can make better use of examples. We need to provide better scaffolding to connect our examples to the students' individual projects. Related to this, a general consequence of having student groups develop their own projects is that it is difficult to generalize from our examples to their projects, therefore this must be done through group supervision, and not during lectures. Also, when describing PD projects from our own research, we often seem to have focused too much on the end result, rather than the process, obstacles, or changes in plans. This also reflects a general point of PD research, which arguably tends to focus on success stories [36]. Finally, we have provided numerous arguments for using live projects in PD, but in our analysis and reflections for this paper, we see occasions where exercises could help to prepare the students to produce better results in the live projects. For example, removing unrealistic expectations of participation, but also to some extent creating magic circle engagement, and possibly sensitive persuasion.

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