Design is a Game: Developing Design Competence in a Game Setting

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INTRODUCTION

In this article we propose design games as a way of building design competence for design students as well as for practitioners. We report on four experiments in which game playing, game creation and game reflection has revealed a potential in developing design competence. We show how the use of games can contribute to talking about collaborative design processes, modelling design situations, exploring real life design and improving an existing design practice. Our findings are derived from both educational and industrial settings.

Keywords

Design games, Silent Game, participatory design, design representations, design teaching

INTRODUCTION

In participatory design the ability to organize collaboration is a central part of the design competence – along with the ability to envision futures and create new artefacts. This poses a particular challenge for design teaching. Learning to establish social interaction between stakeholders in a design process (e.g. users and developers) requires cycles of experimentation and reflection. Traditional project exercises for students typically provide one-shot opportunities only to organise for instance user workshops, field visits, and meetings with companies. In search of alternative ways of developing collaborative design skills, we have explored various forms of board games, because they can establish a frame for experimentation and learning about design collaboration.

The work presented here is an action research effort, i.e. we have developed our understanding of games in design

through a series of interventions in both student and practitioner settings.

TEACHING DESIGN

When teaching design a few years ago we – like most other design educators – introduced students to design literature and organised project-type design exercises. Our ideal was to nourish a 'reflective practicum' [7] for newcomers to experience design practice from the front row.

In spite of 7good intentions, we discovered that this way of preparing students for the social process of designing misfired in several ways.

❑ Design literature encourages students to understand design in theory - not to practice design.

Oral or written attempts to capture the learning process through which methods become part of a design process most often fail because they depend on a de-contextualised construction of a social practice, which is highly situation specific. They become guidelines or recipes of idealised design practice.

❑ Design project exercises offer students an opportunity to experience design methods in action – not to build a repertoire of design practices.

Often students are eager to try out as many participatory design methods as possible in a project setting. Having little prior experience with real life design situations the students will try very hard to stick to their predetermined method or recipe instead of exploring the opportunities of the specific situation at hand. Indeed the students learn by doing, but they are often left with a rather inexpedient frustration of "methods that don't work", as they have no opportunity to reach a level of equilibrium.

Three major concerns arise from relying solely on project-based education in training novice designers. First, students are unable to move beyond the initial fascination of the methods being introduced to them in the design course. Instead of solving real life problems by interacting

with the design situation, they tend to focus on fulfilling the requirements of a particular method.

Second, to catalyse design competence, project based education requires a level of experience, which students don't yet have. The learning process of project-based education is exposing students to new situations and thereby challenges their existing repertoire of 'appropriate' design moves. When novice designers with no prior experience participate in this learning process, they cannot assess the value of design methods, nor can they identify their relevance to the design situation at hand.

Third, project-based education in itself is insufficient to train the reflection activities necessary for the learning-in-action of a design competence. It is essential for students to experiment with ways of carrying out off-loop reflections for forming and consolidating a particular way of working as part of their (collective) repertoire of design practices [7].

Facing these challenges we started experimenting with a design curriculum based on a new design didactic of which design games are an important element.

WHAT IS SKILFUL PARTICIPATORY DESIGN?

In our understanding, design is the creation of new meaningful artefacts in respect for an existing practice. Design is not just the ability to generate solutions to a yet unsolved problem but rather a way of exploring potentiality or development areas in use context. Hence, there is no right or wrong in the process of designing. Design is an inherent endeavour towards "doing better" [2].

When conveying the competence of designing we cannot limit our attention to what a single designer does to a static artefact. We must take into account two important issues (following Harbraken [4]):

First, design regularly involves a variety of different competencies. The artefact to be made is designed in a process of collaboration and negotiation among designers with different motives, professions and visions. To some extent it is even customary to involve participants from use context in the design process, which makes the process of social interaction even more opaque and vague. Design is a social activity that takes place among people who negotiate. The design process is an ecology of participation, communicating both internally and with the rest of the world, depending upon the socially constructed values participants assign each other.

Second, artefacts change continuously. Artefacts are never finished and we keep designing or re-designing them in order to meet new demands from use practice and to benefit from new technologies. Most design work relates to organizations and existing tools that must be added to or redesigned. A change in use practice causes a new demand for more appropriate artefacts to cope with the new situation. Designing technology for people and places always alters a larger object than the artefact itself. It alters the practice, which it eventually becomes a part of.

In our effort to develop a design curriculum that to a larger extent faces the challenges of PD practice, we experimented with games as a metaphor for design collaboration. Previously explorative studies have emphasised PD work as play. Ehn and Sjögren (1991) developed this concept both theoretically and methodologically. Organisational design games were seen as vehicle for 'designing-by-playing'. They used games as a way of involving participants in the process of envisioning and experiencing future work situations in fun and liberating ways [3]. Muller, Wildman and White (1994) have shown through their research, that games are helpful, because they provide a familiar, relaxed and relatively egalitarian atmosphere within which the stakeholders combine their diverse backgrounds to develop new solutions and to meet one another's needs [5]. We acknowledge the work of these studies but we also see a different potential in game playing as yet uncovered. In the following cases we try to explore game playing as a way of building design competence in several ways. We will show how the use of games can contribute to establishing a collaborative design vocabulary, to modelling design situations, to exploring real life design, and finally to improving an existing design practice.

VERBALISING DESIGN

A *Concept Design Game* in the sense of Harbraken (1987) is a board game that models certain aspects of the design process. It has bricks and board, roles and rules, but it differs from ordinary games by having no elements of competition. The game is not about winning; it is a reflective setting for exploring design moves and strategies. We use the Silent Game [4] in student design training to establish a vocabulary for talking about collaborative design practice.

The Silent Game is played by two players (e.g. lead designer and assistant) and an observer. The players use wooden (or Lego) bricks to collaboratively build a design. No talking is allowed during the game.

Player 1 starts the game by placing one or two pieces on the game board to express a personal design idea. Interpreting player 1's move, player 2 makes her move by placing a piece on the game board, in a way that it relates to player 1's move. If player 2 gets the idea, player 1 can expand the idea; if not, she can emphasize the intention in her subsequent moves. Player 2 can typically play along obediently, try to expand the idea, or even try to obstruct it. The game ends when the observer sees no progression in the game. Then a debriefing session starts with the observer's account of the game followed by player 2's and finally player 1's reflections.

The Silent Game is a way of establishing a 'game vocabulary' in a late Wittgensteinian sense [8]: Moving bricks on the game board is a way of establishing a language game with brick moves as acts of speech. (The success of a speech act is determined by whether the recipient understands the communication - not by the media in which the communications takes place.) By playing language games such as the Silent Game, the students get familiar with social aspects of designing: team roles, project constraints, design moves, negotiation strategies, rules to follow, and the inner logic of turn-taking.

The Silent Game
Three students at the Department of Information Science, University of Aarhus, documented the following example of a Silent Game. The log is the students' actual account of the game.

Observer: "The first player started out by placing three blocks of different colours in three corners of what had, by convention in earlier games, contained the playing field. This in such a manner as to invite the second player to place the fourth block of the yet unused colour in the fourth corner. Second player responded by doing just that, and by that ended his turn. **(1)**.

The first player went on to break the defined pattern by placing three blocks on the field in no particular order. Second player responded by placing three blocks next to the newly placed blocks **(2)**.

The first player then placed a single block outside of the frame, and the second player built a small tower. The idea of towers occupied the next phase of the game and resulted in four towers **(3)**.

The final portion of the game consisted of building connections between the towers. **(4)**."

Player 2: "I start out by deciding to follow the strategy of submission, meaning that I will try to follow 'the orders' from player 1. In the hectic end game, no one noticed that the initial frame was used again in the new constructions. Thus we end by the ultimate resetting of the frame for the game. As player 2, I go through the following phase: 1) Determine strategy, 2) Frustration, 3) Change of strategy, 4) Initiative, 5) Cooperation, 6) Satisfying result."

Player 1: "My intention with the game was to create a kind of "meta-game", in which I could test some ways of cooperating with player 2. I had no construction plans, but wanted to create a dynamic and productive game."

Observer: "For me the fascination in this game lies in the implicit communication, that got established between the two players with so little effort, and then didn't seem to matter at all with respect to placing blocks. Instead the communication simply established a consensus that
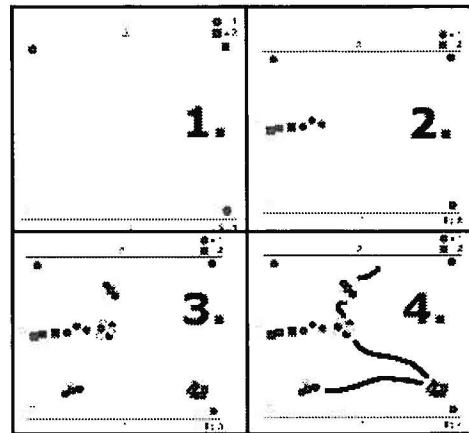
The Silent Game: Two players collaboratively

build a structure using coloured wooden bricks

something was going to be built, and that the exact form didn't matter at all. The end-game seemed to indicate that both players were aware of the deadline implied by the diminished supply of blocks, and both strived to complete the work."

Through this game the students learned that it is indeed possible to enter a mode of design collaboration, even though you do not know – or agree upon – the goal. And that following the lead of the other team members may not be the most constructive strategy.

Our experiments show that the Silent Game is an inspiring interactive frame for training collaborative design processes and reflective design practice in the Schön tradition.

MODELLING DESIGN PRACTICE
Once students are familiar with the Silent Game, we start modifying the rules to simulate real-life collaborative design situations: (What if there are three players? If players can move no more than one piece at a time?). The restricted communication channel of the Silent Game ensures strong focus on the collaborative aspects of design. Students learn to use board games as a test bed for exploring social settings [1]. Then we encourage students to begin creating their own games to simulate a particular design situation they want to study. Examples of the situations we have worked with are 'A newcomer in the design team'; 'The design team acting in the larger organisation'; and 'Coordinating design across several product divisions'.

We ask the students to put a real effort into designing the materials of their game: the board and pieces, the box with advertisements, and a self-explanatory user guide. And to produce not just one prototype, but a small 'manufacturing series' of 4 games. In the design critique session, the students get the chance to try out their games with invited

The Product Value Game: Two players negotiate silently which values they want to attribute to their product using colourful picture cards.

guests. The game creation in itself becomes a design process.

The Product Value Game

One group of design students at the Mads Clausen Institute in Sønderborg created a game for exploring the situation in which team members verbalise and negotiate the 'soft' values they want to realise in their product. The students designed two identical sets of 24 picture cards with colourful images, which can be used to attribute values to a product (strong, fast, organic, easy, etc.). Like the Silent Game, this game has two players and is played in silence.

From a stack of 'product cards', one of the players picks a product for the first round, e.g. a cellular phone. Each player then selects 5 picture cards to represent the values they would like to see in a cellular phone design. Now the players compare their selections. If they differ, they take turns suggesting replacement images to negotiate a shared value set. The game ends, when the selections of 5 cards are identical for both players. In the debriefing session, the players try to verbalise their understanding of the product values and reflect on the negotiation process. Being forced to negotiate pictures without speaking, means that the players develop a very precise understanding of what values the images correspond to, before they put words on them.

One of the students actually tried to use this game in a later project, where he was in a team with two engineering students. The game proved to be very successful for verbalising the often-unsaid product values and for exploring the process of value negotiation between team members.

Traces of good design games

In the Sønderborg design class, we asked the students to evaluate their own design process and to note down what they thought they had learned from the game design project. One Chinese student, for instance, wrote, *"Do something"* on one of his post-it notes. With this he meant that in design – just like in games – you've got to make moves yourself; you can't just sit back and wait for the other team members to take initiative. To him – with his cultural background – this was quite an important point of learning.

We then structured the students' reflection statements using game terms. This experiment resulted in a challenging list of 'instructions' for a successful design game:

- ❑ The material (board and pieces) should be inspiring
- ❑ There should be rules to start the game, but they must not be rigid
- ❑ You should have the option of expanding your role
- ❑ You need to make bold moves
- ❑ Respectful turn-taking is crucial.

The students also formulated the qualities of a successful game: We play, because it is fun to play, because the game takes surprising turns of events, and because it is a challenge to bring the game to an end.

It is evident from this list that the students have learned aspects of collaboration, which transfer easily to 'real' design.

EXPLORING REAL LIFE DESIGN

Can games help students explore what actually happens in real life situations? To acquire design competence requires hands-on experiences as well as conscientious off-loop reflection. Recently we were engaged in a game training session, which on one hand was an attempt to explore real life design situations and on the other hand an investigation into the potential of game construction. By experimenting with different kinds of games we discovered a potential in using games as a framework for off-loop peer-to-peer reflection and among students engaged in different design environments.

One particular episode in a design course in the Malmö Interaction Design programme illustrates the fruitfulness of practicing off-loop reflections in a game setting. Three students from Malmö and one from Aarhus designed a virtual game for sharing experiences about communication in larger organisations. All students were engaged in real life design projects at the time of the experiment. In class they voiced the same frustrating challenge in their work in industry: The students felt that their respective design

project teams (in the companies) had a hard time conveying design visions to the product development departments.

The Vision Communication Game

Inspired by different kinds of design games in the course, the students created a design game as a test bed for exploring how small design teams could overcome the challenges of communicating design ideas to development departments.
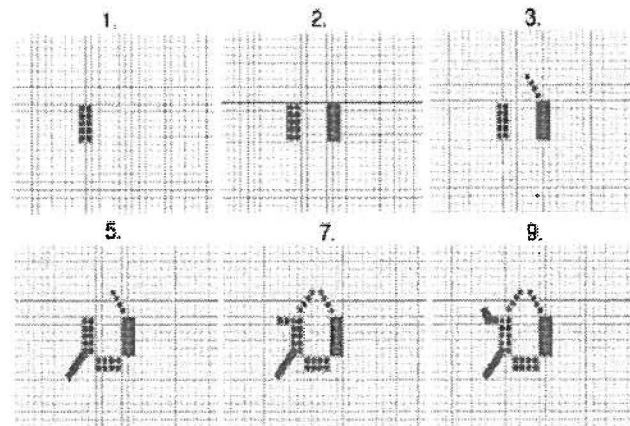
The Vision Communication game involved four participants: Two design team members (designers), a managing designer (the project manager), and a game master (the product development department). Using virtual Lego bricks, the designers developed a design object which was yet unknown to the game master. The designers would succeed in their assignment if the game master within the limit of 20 design moves would be able to guess what this object was. If the game master was unable to identify progression or patterns in the design moves, she had the authority to terminate the game. The game was carried out as a virtual game using nonverbal e-mail communication. In a graphic design programme an 8x8 cm grid acted as game board while different predefined layers were manipulated as virtual game bricks.

While the students were playing their first game, the game master, Susan, was called away to a different design assignment abroad. The players continued undauntedly designing their virtual object, which in this case was a frog.

One week later when Susan returned to the design studio, nine design moves had been executed. Eager to learn what had happened in the design game, she read the pictures in the nine emails in her mailbox. Overwhelmed by the many emails and frustrated by her lack of touch, she decided to terminate the game. Her e-mail to the three players read: "Sorry guys, but my travel has made this game-experiment a bit confusing. I suggest we terminate this game." The three players responded with frustration. To them they had played a progressive and well-documented game visualizing in each move that this object eventually was a frog. Moreover Susan had terminated a research project of essential value to all its participants.

The students brought this game to the design class. Reflecting on the progression and misfortune of the design game, they suddenly discovered an equivalence between their game experiences and their real life design challenge. Susan's careless game termination was just as inconsiderate as managers' lack of interest towards the findings of their respective design teams. Indeed the students had developed a game with a match to their own real life design experience.

When encouraged to analyse this particular game, one of the students suggested that

The Vision Communication Game: Players collaborate to create an object via e-mail. This frog was built in moves between three participants.

> "An integrated and important part of developing state of the art interaction design is continuously involving stakeholders in the research progress."

In the Vision Communication Game the students discovered that the design team itself had to take action towards securing continuous interaction with the product development department. In subsequent games the students experimented with several ways of keeping an ongoing communication with the game master and thereby exploring different methods for collaborating.

To experienced designers the process of communicating new design ideas to stakeholders all through the entire design process would sound trivial. One could accuse the teacher of not sharing this common knowledge of design practice with his students. But design competence is acquired neither in an all-scholastic environment nor in an all apprenticeship practice. Novice designers must - in a process of what Schön calls reflection-on-action [7] - frame the situation at hand by themselves and take action according to their design repertoire. We will argue that this process of framing a design situation and subsequently applying off-loop reflections in a game environment expands the student's design repertoire.

DEVELOPING DESIGN PRACTICE IN INDUSTRY

Are games simply teaching tools for novice designers, or can they also help design practitioners reflect and improve their design practice?

Recently, one of the authors was asked to facilitate a workshop on future usability practice at a Danish software company. Due to strategic changes within the company organization, the internal usability group was faced with the challenge of turning its activities into an independent business, catering not only to internal departments, but also attracting external clients. Triggered by recent usability

disasters in public Danish software projects, and inspired by the work of Jacob Nielsen (1994 [6]), management had identified usability consultancy as a promising new business opportunity for the company.

The usability group was transferred from the internal service department to a product development unit and lost its corporate financing. Thus the group was forced to change its explorative, research-oriented practice and develop a more promotion minded approach to usability work.

At the time of the workshop, the usability group had one year of experience in its new organisational position. The group had already attracted several external business clients – much to the satisfaction of management. However, members of the usability group expressed discomfort with their new work practice. The workshop was an introspective session for the group, in which game playing served as a framework for exploring new practices of design collaboration.

Through the first two hours of the workshop the participants played the Silent Game to get familiar with game terms. The participants slowly pushed the games from straightforward product oriented design games to more complicated process oriented collaborative challenges. For instance, in their first game participants designed a multi-coloured flower, in the second game they modelled an urban environment.

Then, when asked to verbalise what they considered major challenges in their new work practice, the participants identified five questions:

"(1) How do we engage external software developers more actively in our usability projects?
(2) Why do we document our usability projects even though we always start from scratch?
(3) How do we improve our process competence when we have no means for team training?
(4) How do we sell usability services to clients who are black boxed to resent usability practice?
(5) How can we in a more sufficient way share experiences within the usability group?"

After intensive discussions the participants chose the question of selling unknown services as the core challenge.

In an effort to identify exactly how to facilitate the assignment of creating a 'learn to sell usability services to clients black boxed to resent usability practice' game, we asked for an account of their shared interpretation of this particular challenge. The group stated their client's motives as unclear and sometimes even unaware of the entire notion of usability. In their uncertainty, clients turned to 'reliable' information channels such as management or programmer magazines, which in a common manner introduced the concept of usability *tests*. Some clients referred to Jacob

Nielsen's 'Usability Engineering' [6] emphasizing usability *testing* as the core of usability practice.

Most frequently the usability group was asked to do a traditional usability test conducted in the laboratory, *testing* only the screen interface of a future software application. However, the group identified as their main asset the practice of participatory design and ethnographic field studies. The group's understanding of usability was not limited to GUI design, but included studies of practices that the artefact was a part of. When clients asked for a usability test, the group would try to explain the limitations of traditional usability testing and then convince the client to spend additional costs on the more labour-intensive usability *studies*. The group was able to give a rigid and well-articulated version of this particular challenge. We got the impression that this topic was frequently discussed in the group and hereby the challenge was a well-integrated part of their shared bias. Therefore we encouraged the group to bring forward associations or analogue situations as a framework for sketching the game of 'miscommunication with clients'.

During the discussions, one of the participants suggested the game of 'Sink the Ships'[1] as a metaphor. He pointed out a number of analogies between the board game and their own situation.

The players in Sink the Ships cannot see the game field of the other player. In client negotiations, the usability group tries to detect the intentions of clients who are unable to articulate their wants. And clients are on the other hand unfamiliar with recent usability practices.

A player in Sink the Ships only has a certain number of chances to 'hit' the targets without knowing exactly which strategy to choose. The usability group usually brings forward three different offers on a certain usability service. If even the lowest offer is too expensive, the clients go elsewhere to purchase the service.

Communication in Sink the Ships is reduced to a very formal and well-defined language in respect to turn taking, gestures and time of response. For usability consultancy, the clients mostly expect traditional business conventions: The customer sets the demands and the vendor fulfils these needs unconditionally. It is costly and risky to engage in discussions of a customer's actual needs before a contract is signed.

The metaphor animated the group to talk about their challenge in constructive manners and to develop their own

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[1] Sink the Ships is a classic two-player game of naval combat. The opponents start the game with five ships each on a hidden grid board. The objective of the game is to sink the opponent's ships before he sinks yours. Each has a set number of cannonballs to fire at the other. Using strategy and a bit of luck, sink all of your opponent's ships first to win the game.

game to explore options. The usability group started to create a board with two 'private' areas separated by a wall (box file). The discussions were carried out on two levels: The participants suggested different objects and gestures in the game frame, but the arguments for using these objects and gestures were taken from their real life experiences of client negotiations.

The Client Negotiation Game

In the end, the group designed a game that involved three player roles: the client, the usability consultant, and the end-user as game-master.

The rules of the game were as follows:

1. The client makes a written demand for a particular object that the usability consultant models with bricks. The design assignment is unknown to the end-user.

2. Having built the assignment on his/her private area of the game board, the consultant states an offer on the model explaining how many (and which kind of) bricks he/she has used.

3. Now the client models the same object on his private area of the game board using the same amount of bricks as the usability consultant (or less).

4. The two participants negotiate in turn which bricks are necessary and which can be left out. Each participant can make two propositions. The objects are still invisible to the other participant.

5. The players succeed if the end-user – now entering the game - can identify the object of the usability consultant.

The usability group managed to articulate and reframe their conception of client relations by using bricks, roles and game rules. By playing their own game, the usability specialist gained new insight about the difficulties of bridging customers' wants and usability know-how.

Our experiences from this software company suggest that it is very fruitful to explore future design moves in a game setting. Game construction and game reflection can work as a test bed for off-loop reflection in a design project.

LESSONS LEARNED

Although our experience is limited to three years of study, we see games as a particularly appropriate environment for participatory design practice training. The game frame encourages participants to pay attention to the social and communicative processes of design. Conducting participatory design is indeed a process of understanding and supporting collaboration and interaction between participants in the process of designing new artefacts.

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