Reflections on Experience-Driven Design: a Case Study on Designing for Playful Experiences

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ABSTRACT
User experience (UX) has been recognized as an important quality factor of interactive products and services. Current design practices aim at ensuring a generally pleasurable or satisfying UX. However, approaches and methods for designing for specific experiences are still scarce. This paper addresses *experience-driven design* (EDD) by reflecting upon a study where playful experiences (PLEX) were utilized as design targets in a practical design assignment of a post-graduate seminar. The outcomes and learning experiences imply that utilizing PLEX as target experiences in the EDD approach is a sound way to provide design inspiration and guidance, and help refining early design ideas. The pre-defined playful experiences were considered as fruitful starting points for brainstorming as well as constant reminders of the rationale of the design. The paper concludes with reflections on applying EDD and four roles in which it was found beneficial: guiding & framing, inspiring, evaluating and communicating.

Author Keywords
Experience-Driven Design; Playful Experiences; Target Experiences; PLEX Cards; Conceptual Design; Stimulus; Design Methodology; Design Considerations.

General Terms
Human Factors; Design.

INTRODUCTION

As markets become more saturated, user experience (UX) has become a central competitive quality of interactive products and services. UX as a concept has been addressed in a multitude of studies and conceptual frameworks (e.g., [10,20]). Such frameworks and theories help understand the scope and characteristics of UX and how it relates to other user-centered concepts of quality (i.e., *what* it is), as well as how to measure the various facets of UX.

A central gap in the literature has been identified to be *how to design* specific experiences. Some design methods focusing on UX do exist (e.g. probes [7], experience prototypes [2]). However, concrete design approaches that enable or, rather, help in aiming at specific experiences are still scarce, and there is little understanding of how to design inherently subjective and dynamic user experiences in the first place. This has instigated a trend towards experience-driven design (EDD), in which a particular experience (or several of them) is taken into the epicenter of the design process – as a source of inspiration and targeting [4,9,11]. Setting an experiential goal or target for the design can allow more efficient and successful design processes, resulting in products or services that are capable of promoting and demonstrating specific user experiences. Furthermore, this has brought up the notion of, instead of 'designing experiences' per se, it is rather about designing *for* experience [9] – with an aim to allow or enable specific experiences with design decisions.

In the beginning of our work, we defined that EDD:

- Takes (user) experience as a starting point; "valuing the whole person behind the 'user'" [22]
- Uses the targeted experience, and stories around them, as a central concept of the design vision [9]
- Focuses on the key design elements: context, interpretation, participation [22]

While the concept of designing for target experiences is appealing, there remain several gaps in research and practice. In the HCI field, these gaps still partly result from differences in interpreting and defining what user experience is and, more specifically, what a pleasurable or satisfying UX means. Partly, the gaps are results of the fact that design research and user experience evaluation research are not well integrated. Designers are able to create high-quality designs but explicit user experiences are rarely used as targets of design and the impact of design on user experience is not often thoroughly tested.

Rather than trying to solve all challenges in integrating design and user experience research, we prioritized the perspective of designing with specific UX elements as starting points. As a part of our UX education at Tampere University of Technology, we organized a post-graduate level seminar on experience-driven design. Our aim was to teach – and experiment – how to use experiential targets as design guidance for conceptual design of interactive

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systems, and to introduce a more "designerly" [21] way of working. The design problem was related to the challenges that winter causes in moving and navigating. In this domain, we wanted to explore how specific *playful experiences* could be utilized as target experiences in this domain and what kind of different product or service concepts they would result in. This paper presents the observations and lessons learned while running the course. We present the student groups' design outcomes, reflections on the benefits of utilizing EDD with playful target experiences in this case, and various lessons learned to consider in applying the EDD approach in a novel way.

RELATED WORK

The following covers relevant literature for the two central topics: experience-driven design as an approach or methodology and playfulness as an experiential domain.

Experience-Driven Design

User experience has been taken as a driving design force in some earlier approaches. Wright and McCarthy [22] describe how HCI has moved towards experience-centered design and highlight the importance of understanding context, interpretative approaches to research, and participatory design. Designers and users are co-creators of experience, and user values are central focus of the design. Dialogue between the designers and participating user representatives is crucial and sets the scene for active engagement of the users in the design process. Still, even though experience is in the core of the design philosophy, specific experiences are rarely taken as design targets.

Experience-driven design starts from understanding the "why" and leads to products that are sensitive to the particularities of human experience [9,12]. Hassenzahl [9] presents an approach on experience design where user needs are studied and set as the starting point of design. Then the experiences which are related to the specific needs are taken as target experiences. The functionality should be designed to support those needs to provide coherent user experiences with the product. Experiences are subjective, holistic, situated and dynamic, and they should be worthwhile. These aspects can be deliberately designed by taking into account the needs and motives, as well as pragmatic goals of the target users.

Desmet and Schifferstein [4] argue that specific target experiences can be used as design targets. They present central "ingredients" of experience-driven design projects, related to understanding user activities and situations, envisioning target user experiences, and creating and evaluating new service concepts. Concept creation is essential in the formulation of the target experience and, based on them, the overall target product character. The creation phase then moves on to building user-product interaction scenarios and experiential models, and the target experience evaluation. Desmet and Schifferstein's book describes a number of student design projects where experience has been taken as a starting point for product design. The design projects included, for example, an aircraft passenger cabin should support the experiences of control and safety (p. 222), and a sports device for blind children that supports their self-confidence and independence through experiences of chaos and order. Desmet and Schifferstein conclude that there remains a big gap between the "design dreams" (based on the target experiences) and the outcoming designs. Still, they argue that the target experiences "envision possibilities […] and add value that goes beyond product optimizations, product-line extensions, or other not very daring design challenges." (p. 225). Especially this vein of research is conceptually close to our understanding of what experience-driven design is.

Desmet and Schifferstein [4] also list two challenges for Experience-driven design: "The first is to determine what experience to design for, and the second is to design something that is expected to evoke that experience". Regarding the latter challenge, designing for experience is not simple since a certain experience cannot be *guaranteed* by design [23]. The resulting UX depends not only on the system but also on the context of use and the users and their motivations, needs and emotional states [14]. Consequently, comparing to design of usability, designing for experience is more open-ended and uncertain: objectively measurable targets are harder to be set and their realization assessed or validated. Nevertheless, targeting for experience can provoke and inspire new mindsets for design practices and help considering experiential and emotional outcomes of the use of products or services.

This paper extends this overall discussion around EDD with a case study that (1) focuses in the context of *playful* experiences and (2) varies different target experiences to the same design problem. This way we expect to receive more in-depth understanding about how target experiences can affect the design outcomes.

Playfulness as Experiential Domain

In our approach, we decided to focus on *playfulness* as a category of specific types of experiences. Playfulness can be observed in all areas of human activity as an attitude of making the activities more enjoyable [6]. Designing for playfulness is about creating objects that elicit a playful approach and provide enjoyable experiences in their users. A playful approach means taking on any subject matter or activity with the same attitude as in play: as something that is not serious and that does not have real-world consequences.

Korhonen et al. [15] initially defined a playful experiences framework (PLEX), which was later revised to consist of 22 playful experience categories [1]. The PLEX categories cover a broad spectrum of experiences, some of which seem evident in play activities (e.g. *Challenge*, *Competition* and *Captivation*), while others may appear surprising in this context (e.g., *Suffering* and *Eroticism*) or common also outside this context (e.g., *Sympathy* and *Expression*).

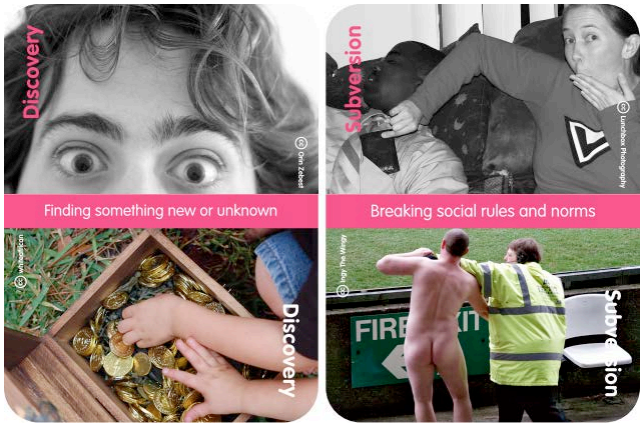

Figure 1. Two examples of the 22 PLEX Cards. Each experience category is presented as a short textual summary and illustrated with two descriptive images.

Consequently, PLEX might not always bring about explicitly playful designs.

Based on the PLEX framework, Lucero and Arrasvuori [17] have created a set of cards to communicate the 22 playful experience categories and provide inspiration to designers while designing for playfulness. The design, iteration and evaluation of the PLEX Cards (see Figure 1) and its two idea generation techniques have been presented in [17]. The evaluation results suggest that the PLEX Cards are a valuable source of inspiration when designing for playfulness; however, in order for the PLEX Cards techniques to be effective as idea generation methods, it is important to frame the design problem by setting a clear task or context. These findings were considered when planning the design activities of the course. Furthermore, Arrasvuori et al. [1] describe the utilization of a range of PLEX categories as stimuli throughout the design process of an interactive miniature garden for social interaction. Furthermore, Holopainen and Ollila [13] discuss the use of PLEX categories in the design of a mobile Augmented Reality playful application concept.

CASE STUDY: PLAYFUL EXPERIENCES AS DESIGN TARGETS IN CONCEPTUAL DESIGN

We approached the exploration of the possibilities and limitations of EDD with a post-grad seminar course where participants are not professional designers. Despite the educational setting, we claim that the lessons learned from this study can be applied also to actual design practices. Furthermore, this way we could explore the effectiveness and ease of approaching broad design problems with EDD.

The seminar course consisted of (1) a practical assignment of experience-driven design, with the expected end result of conceptual design of a novel, technology-based service or product, and (2) three 90-minute lectures containing an overall introduction to EDD as a design approach, human emotions and experiences, PLEX Cards, and the dialogue-labs method [18]. The educational intent of the seminar was to increase students', as well as teachers', understanding of how to do conceptual design in an experience-driven approach. The following describes the practical assignment in detail with regard to the starting points for the design, the design problem and the student groups' outcomes.

Practical Assignment and the Design Problem

Five groups of 3-4 students were given the task to produce some kind of a tangible or well-visualized demonstration of a new concept of interactive technology. This was expected to produce or manifest specific type(s) of experience(s). The type of the concept was not limited, meaning that it could demonstrate, e.g., a new interaction technique, application, service or device. The design problem was the same for all groups: "*How to support moving and navigating in the Finnish winter?*" As students lived in Finland, they were familiar with the related challenges, such as coldness, limited visibility, snow covering roads and paths, and the nature going into hibernation. As a design context this was timely as the seminar started in early February 2012.

The designed service or product concepts were instructed to be demonstrated with at least a video describing the use and experiences created by using it, and possibly also storyboards and physical or digital mock-ups. Furthermore, the concepts were expected to be appropriate in their intended context of use and target users and to involve technical and/or interaction-related novelties. The mentioned examples included tangible interfaces, context-awareness or mixed reality. To assess the appropriateness, a small-scale informal end user evaluation was required at some phase of the design process. Finally, an extensive design report was required, describing, e.g., the design process, justifications for choices made, and how the target experiences would be demonstrated in the use of the designed service or product concept.

Target Experiences

The categories of target experiences, i.e. PLEX Cards, were grouped by the teachers to provide more design space and flexibility through several, semantically related types of experiences. The meta-categories were as follows:

- **Adventure**: *Discovery*, *Exploration* & *Captivation*
- **Caretaking**: *Nurture*, *Sympathy* & *Control*
- **Excitement**: *Thrill*, *Subversion* & *Humor*
- **Excel oneself**: *Suffering*, *Challenge* & *Completion*
- **Imagination**: *Expression*, *Fantasy* & *Simulation*
- **Physical**: *Sensation*, *Relaxation* & *Eroticism*
- **Social**: *Fellowship*, *Submission* & *Competition*

Overall, we expected that, instead of providing merely one target, the variance would broaden the design space; this would ease getting started with the brainstorming and also consider several aspects in designing the concept. Furthermore, we wanted to explore how the groups handle and make selections based on multiple targets instead of

one. Considering this, the experiences in the meta-categories were intentionally semantically related – rather than contradictory or otherwise unrelated – to avoid the groups having to reject promising ideas because of contradictions. The *Cruelty* category was excluded to achieve balance in the number of experiences per meta-category and because it did not bundle with the meta-categories as nicely as the other experiences.

From these seven meta-categories, one theme was raffled for each group of students. With five groups, the two left-out sets were **Physical** and **Excel oneself**. In addition to giving the groups the PLEX Cards, the experience categories were shortly explained during a lecture. The name of the meta-categories – invented by the teachers – possibly affected the groups' thinking; however, the emphasis in the instructions was on the three target experiences in them.

Design Process

The overall design process consisted of a teacher-facilitated co-design session (based on the Dialogue Labs method [16]) for early idea creation and a free-form process to refine the ideas and elaborate them into concepts and finally to videos. The structuring elements in this session consisted of space, materials and process. The aim was to spark the dialogue between participants, involve participants in the ideation, concept development and early prototyping phases, and bring together different perspectives. The session lasted four hours and was held after a week from the last of the three lectures.

The co-design session consisted of five stages in which ideas were created and refined. Each group visited the stages one by one, hence in slightly different sequences. The groups' PLEX Cards were carried along from stage to stage as reminders of the ultimate design goals. The five stages included different aspects and methods to consider and utilize. First, each stage focused on a specific subtopic under the overall design problem (defined by the teachers): keeping warm & equipment, change of landscape and routes, slipperiness and deep snow, finding interesting places in the winter wonderland, and lack of visibility. Second, each stage introduced different tasks and methods to facilitate brainstorming: watching illustrative videos about target contexts, visual sketching with pen and paper, creating collages of given pictures about various aspects of winter, VNA-cards (packs of verbs, nouns and adjectives) [16], and utilizing other PLEX Cards than the groups' own with the PLEX Brainstorming technique [17]. Finally, after spending approx. 30 minutes in each of the stages, the groups gave short pitch talks in the end to present their 1-4 best ideas and get feedback from peers and the teachers.

Half-way through the seminar period, the teachers organized a 1-hour critique and discussion session for each group. In total, after the co-design sessions, the groups had 1.5 months to complete their assignment. Various perspectives and observations of both teachers and students were gathered as written notes at the half-way review sessions and the final meeting. In addition, the students' subjective experiences were gathered with the help of the final report and an anonymous online questionnaire in the end of the seminar.

Participating Students

Altogether 16 students attended the seminar. The groups for the assignment were selected by the teachers to balance the research and design experience between the groups (based on a background questionnaire). There were 8 males and 8 females, ages varied from 27 to 44, 13 of 16 were doctoral students and 3 master students, and all had a background in computer science, interactive technology, usability or other HCI-related field. Design experience varied greatly, from no experience to a few years working as interaction designer, however most had only taken a few design-related courses before. On the other hand, methods of user research and evaluation, such as interviewing, prototyping and questionnaires, and the overall user-centric design process were familiar to all.

Resulting Concepts

Overall, the resulting concepts display a nice spectrum, the main elements varying from mobile applications and novel interaction devices to public services in the society. In the following, each concept is briefly described and discussed in terms of how it demonstrates the target experiences. The relations between the characteristics of the concept and the target experiences are further analyzed in the Section "Analyzing the Design Outcomes".

Affect Me

Affect Me (Figure 2) aims to maximize user experiences from what would be ordinary short journeys by introducing emotive and points-of-interest (POI) along a walking journey, together with proactive suggestions. The concept was targeted to demonstrate experiences of *Fantasy*, *Expression* and *Simulation*. It consists of a smart jacket with tactile guidance of the user in the winter landscape. The jacket can proactively augment the user's physical journeys with special sensations and stop-offs through embodied interaction [5], while also allowing users to remain in the cognitive flow of the environment and the delights of the journey. Especially *Fantasy* and *Simulation* are expressed as someone or something is guiding the user. *Expression* mainly relates to gesture-based input from the user to the jacket.

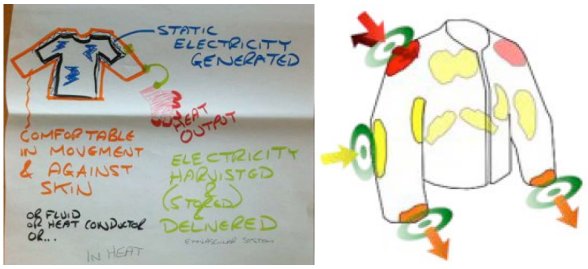

Figure 2. Left: early sketches of the concept. Right: jacket with signal and actuator positions.

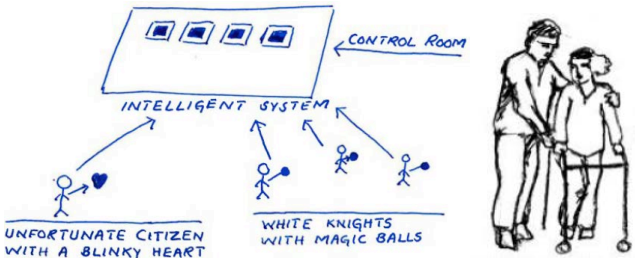

Figure 3. Left: overview of the city-wide centralized service. Right: an early sketch of the service effectivity.

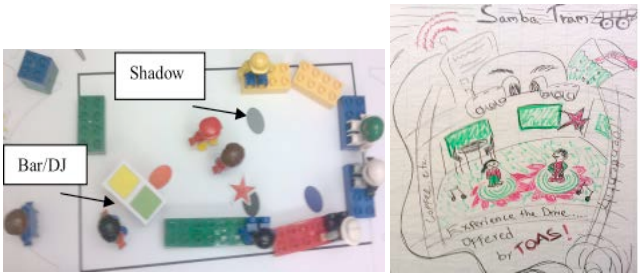

Figure 4. Left: A sketch of the physical appearance of a car in the Samba Tram. Right: an early sketch of the overall concept.

Figure 5. Left: the mock-up of the interaction device. Right: an illustration of an augmented reality game for the glove.

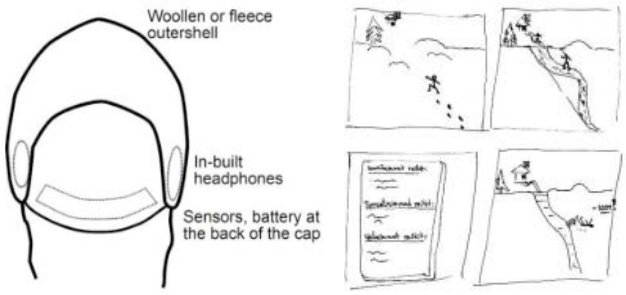

Figure 6. Left: description of the wearable interaction device. Right: an early scenario sketch about adventuring.

Blinky Hearts

Blinky Hearts (Figure 3) presents a collaborative caretaking system for helping out people and, reciprocally, being helped in practical matters and small emergencies. The target experiences include *Nurture*, *Sympathy* and *Control*. The concept consists of a Blinky Heart device for triggering need for help (e.g. extra hands needed to push-start a car) and a Magic Ball –device that guides the helper to the person requesting help. With the help of the device people can also inform the service about any problematic spots in the city, simply to warn others and identify problems to fix. This information would be delivered to a central system that is a part of a smart city. All the three target experiences come about through a community of people using the service to help each other; the concept nicely embodies the social nature of the target experiences.

Samba Tram

Samba Tram (Figure 4) is about a collective experience of avoiding misery during the long winter: it brings elements of social media into physical and local form in public transportation. This gives people a breakaway in the hectic work life and turns dull social norms in public transportation upside down – demonstrating *Humor*, *Subversion* and *Thrill*. One goal is also to motivate people become acquainted with fellow passengers. Samba Tram consists of interactive materials, displays and 3D sound system, which can project shadows, photos, colors, music and other immersive stimuli that help people get out of their daily routines and landscapes (*Humor* and *Thrill*). Persuasive elements are included to surprise the user and initiate social interactions, hence demonstrating *Subversion*.

SeekThrough

SeekThrough (Figure 5) is a concept about a winter glove that would serve as a wearable interaction device; augmented reality output through the camera in the other side of the glove and gestures to provide input (e.g., shaking hands, hugging). It is envisioned to allow embodied interaction in, e.g., a social game where augmented reality cues for real-world locations called 'stashes' are provided to the user. The stashes present them with tasks that can be solved solo or in a group. Considering the attributes of wearable computing by Mann [19], this concept aims to be at least unrestrictive to the user, not require constant attention, and be attentive of the environment. Considering target experiences, *Competition*, *Fellowship* and *Submission* are demonstrated. The experiences seem to mainly results from the applications used with the interaction concept, whereas the design problem is more evident in the device itself.

Story Cap

Story Cap is a wearable output device (Figure 6) that encourages users to exercise outdoors by creating an audiobook-like interactive story. The narration advances only when the user is actively moving. Occasionally it allows choices that affect the storyline to the user; these are selected based on the user's actions during the exercise. The concept aims to demonstrate *Discovery*, *Exploration* and *Captivation*. *Captivation* is concretized in being able to interact with the story and the user forgetting the surroundings. *Exploration* and *Discovery* are about the user experiencing something new and finding new interesting places or jogging routes. Similarly as with SeekThrough, the experiences result from the applications rather than from the physical product per se.

Overall, it can be concluded that all groups greatly extended the design scope and were able to tackle a wide spectrum of

different aspects related to life during the winter – extending from practical and mental challenges to utilizing the possibilities in the winter landscape and people's sense of empathy. Furthermore, all the concepts demonstrate the target experiences in various ways and with varying levels of strictness. These aspects are further discussed in the Section "Reflections and Lessons on EDD".

Results of the Final Questionnaire

In the end of the seminar course, the students were expected to take a short questionnaire to share their personal reflections on their creative moments during the practical assignment, experiences of the most useful and inspirational parts of the seminar, as well as the practical arrangements.

The first section of the questionnaire considered moments of exceptional creativity, such as 'Eureka' or gaining new insight during the seminar. 2/15 reported that they had experienced such moments "not at all", 4/15 "once", 3/15 "twice", and 6/15 selected the option "three times or more" (answer missing from one student). With an optional open ended question, we inquired about the situations, circumstances, triggers, or reasons that they thought might have explained or caused them. The answers included a broad selection of aspects, including the co-design session, target experience categories, testing the concept with end users, brainstorming, collaboration in general, creating the video demonstration, and creating design artifacts like storyboards and mock-ups. The following anonymous quotes demonstrate a few thoughts related to what the EDD approach can be seen as the reason for:

"*Eureka on how much people are able to create from very little!!*"

"*Realizing that an experience can be used as an inspiration for design, and kind of also to set some criteria for the design.*"

"*I had a great idea right after hearing the basic problem and our target experiences.*"

Next section inquired about the most challenging or difficult and, on the other hand, the most interesting or rewarding phases of the practical assignment (Table 1). Here, they selected as many options as they wanted for both the challenging or difficult (☹) and interesting or rewarding (☺). The listed phases were predefined by the teachers.

It seems that brainstorming in general was interesting and rewarding – perhaps thanks to the target experiences – but choosing between the solutions and taking the next step towards detailed solution were more challenging. The "Other, what" options included mentions about group work in general and finding a balance between the given design problem and the target experiences.

# of selections

Phase or activity	☹	☺
Understanding the given target experiences	0	1
Deciding the specific problem within the given topic	7	3
Brainstorming the solutions to the problem	1	10
Choosing between the different solutions	8	1
Designing the details of the solution	6	4
Building the prototype	3	4
Evaluation with users	1	6
Preparing for the video (e.g. scriptwriting, choice of place and people)	2	6
Shooting the video	2	3
Editing and post-processing the video	8	4
Reporting and final presentation	3	2
Other, what?	2	1

Table 1. The most challenging or difficult (☹ column) / interesting or rewarding (☺ column) phases of the practical assignment. # of selections (several options could be selected).

The reasons behind these selections were asked with open questions. While some interesting challenges were reported related to, e.g., group working, user evaluation and video production, the following relate to EDD as an approach. First, it was challenging to fit the problem described in the brief and the target experiences together, mainly because of slight contradictions between the target experiences and the problem context. Considering both as limiting factors for idea creation consequently became more challenging than having only one limiting factor (3 similar mentions). Second, one student mentioned that "*there was no method for evaluating the different design ideas in early phase and we had to choose the right ones from the top of our heads*". Although the target experiences could apparently be used for revisiting the ideas, perhaps they did not allow assessment that is detailed and comprehensive enough.

As for rationales behind selecting the interesting or rewarding phases, the reporting was considerably shorter and simpler, mainly culminating in what was fun to do and what were the most educational phases or activities. In regard to target experiences, they were mentioned to have helped groups in planning the user evaluations and gathering comments from peers.

REFLECTIONS AND LESSONS ON EDD

Overall, the course was experienced as edifying both by the students and the teachers. The following discussion consists of the teachers' reflections on the design outcomes, the usefulness of the used design approach, and a few lessons learned based on the students' and teachers' experiences.

Analyzing the Design Outcomes

The design outcomes display a wide spectrum of different types of concepts of interactive technology, varying from

interaction devices to application concepts and social services. More importantly, most involve several aspects: for example, Affect Me, SeekThrough and Story Cap present a novel interaction device but the applications built on these are equally important for achieving the target experiences. Blinky Hearts and Samba Tram also involve new interactions but the focus seems to be more on the applications and their behavioral and societal consequences (e.g. creating the experience of *Nurture* or *Subversion*).

The five concepts were further analyzed in terms of product elements through which the experiences are demonstrated or from where they are originated (see Table 2). The groups did not explain very well how each experience is demonstrated in the concepts, meaning that the following analysis consists of the teachers' perceptions and dissection of the concepts, rather than the students'. We utilized the model by Hassenzahl [8] with the following three elements to analyze to which product characteristics the experiences can be seen to relate:

- **Product features** are chosen and combined by a designer to convey an intended product character, consisting of, for example, functionality, content, interaction style, and presentation style.
- **Apparent product character** is a high-level description of the personal construction and perception of the product features (e.g. the product seems novel, interesting, useful)
- **Consequences** are judgments about the products appeal and emotional and behavioral consequences (e.g. pleasure, getting inspired by using the product)

Considering Table 2, because of the slightly speculative and subjective nature of this analysis it is hard to specify one single element that 'explains' the resulted experience. After all, experiences are consequences of several elements and features in the product or service, as well as the context in which it is used. Nevertheless, this analysis indicates yet another aspect in the diversity of the resulted concepts and provides one example of how to inspect the design outcomes in regard to the target experiences.

The original design problem related to winter was present in some form in all the concepts but it seems that the experiential targets had extended the groups' design scope. The designs make sense also for the design problem but the playful experiential targets were often more emphasized in the outcome than the pragmatic realities related to the original design problem. For example, Samba Tram could create *Subversion* and *Humor* at any time of year but its effectiveness might be at its best during the dispiriting winter. Similarly, Story Cap could serve as efficiently around the year but was here designed as a thick winter cap.

Interestingly, most concepts seem to embody all the three given experiences, even though this was not stated as a requirement. However, some groups (esp. SeekThrough and Story Cap) felt it challenging to distinguish between and describe how two or three rather similar experiences (e.g. *Discovery* and *Exploration*) are demonstrated. Especially in the case of Story Cap, the fact of being able to easily include all the three target experiences could be mostly a result of the experiences being rather overlapping by nature.

Overall, it seems that having three targets pushed the groups to rethink how the different targets could be reached by considering different aspects in the design. The designed concept could thus contribute to creating the target experience on multiple levels and ways. On the other hand, we do not know how much the grouping of the experiences narrowed down the groups' design choices and made them discard early ideas based on this – rather than based on novelty or level of interest of the ideas, for example.

	Product features	**Apparent product character**	**Consequences**
Affect Me	*Expression* comes about through the gesture-based input	The product can be perceived to provide the user with experiences of *Fantasy*	*Simulation* is a result of simulated personal guidance in the landscape
Blinky Hearts		*Control* from having a specific device that signifies being a helper and from having a centralized service control	*Nurture* and *Sympathy* when taking care of other people in trouble and sharing an emotional connection with them
Samba Tram	*Humor* through the funny "shadow avatars", 3D graphics and sounds	*Thrill* and excitement by exposing the users to something new and stimulating	*Subversion* by breaking social norms in how to behave in trams
SeekThrough		The apparent product character can lead to believe the product to promote *Fellowship* and *Competition*	*Competition*, *Fellowship* and *Submission* all come into play as consequences of the social game and group work
Story Cap	*Captivation* comes from the multimodal output and being able to interact with the story	*Exploration* comes from the overall perception that the product allows exploration and investigating one's surroundings	*Captivation* is also a consequence of immersing oneself in the story. *Discovery* results from finding new things and routes by using Story Cap

Table 2. Mapping the resulting concepts and different elements onto target experiences

Finally, the novelty of the design outcomes could be assessed and investigated in terms of how well the EDD approach possibly contributed to it. As such an analysis would require extensive reflection to prior art, this analysis is left out from the scope of this paper. Nevertheless, put shortly, the concepts utilize interaction techniques that are relatively new in the HCI field. More importantly, the fact how they are used and what applications are built on top of them can be argued to contain interesting and actual novelties – at least when considering that the concepts were created by students with narrower understanding of the prior art than what experienced designers would have.

Benefits and Roles of EDD with PLEX

Our case study suggests that using EDD together with such playful experiences is indeed a sound starting point for designing novel concepts from the scratch. This is grounded on (1) the spectrum of different types of concepts designed around the same problem (as described in the previous sections), (2) the students' perceptions of the usefulness of the PLEX Cards as tools for facilitating and enriching brainstorming and other design activities, and (3) the teachers' perceptions of the educational effectiveness of EDD in general. Based on the subjective perspectives of both the students and teachers, the following discusses the benefits of EDD through highlighting four roles in which EDD was experienced useful: (1) *guiding & framing*, (2) *inspiration*, (3) *evaluation*, and (4) *communication*.

Guiding and framing refers to the target experience serving as an ultimate purpose and guide in design. As one student put it: "*having the target experiences given to us was limiting, but it definitely forced us to actually design 'experience-drivenly'*. EDD and PLEX helped the groups to maintain focus and, on the other hand, gain new perspectives. It helped framing and narrowing down broad ideas: for example Affect Me started off with an idea of an interactive jacket but the use case had to be specified to be able to convey the specific target experiences. In addition, several groups mentioned that the PLEX categories were easily lost in the brainstorming but could easily be reflected with in order to re-emerge, hence helping to rediscover the focus. This is rather similar to how user needs and values serve in user-centered design in general [14].

Inspiration is about getting 'out of the box' in idea creation and allowing new perspectives. Target experiences can motivate designers and help striving for excellence in idea creation and innovation in general. It was seen that especially such playful experiences in which the connection to winter was not that apparent pushed the groups to avoid simply selecting some suitable experiences to the ideas they first came up with (i.e. post-rationalizing the target experience). As one student put it, "*If we would have been able to define the target experiences ourselves, it would most probably have led to obvious or too easy target experiences*." Considering the students' backgrounds, such generic target experiences seemed a good starting point for brainstorming even for mostly non-design-savvy engineering students. Also the discussion in the final presentations suggested that the designs would have been more conventional without the playful experiential targets: "*Without the PLEX experiences, the concept would have been probably boring. PLEX forced thinking, it created more variety*." (member of the Story Cap group)

"*The PLEX Cards pushed and pushed us to do better and better; but in a natural way*." (member of Samba Tram)

Evaluation is facilitated by having a constant reminder about the ultimate design target. The target experiences were used to prioritize early ideas and reflect upon during the design process. Having defined the experiences helped in validating the outcomes and success of the design. For example, one group mentioned to have created specific metrics to measure if the concept actually creates the targeted experiences. In addition, in the co-design session, it seemed to be natural for the peer groups to assess to what extent the target experiences were present in the early concept ideas that were presented. On the other hand, some groups found it challenging to evaluate the early ideas with the help of the experiences, as reported in the questionnaire.

Communication refers to 'selling' the product vision internally and marketing it to customers and other external stakeholders. A target experience can help communicating who the users are, what the context of use is, and describe the subjective and experiential outcomes of product use. The approach was found beneficial for sharing ideas and communicating, which are key aspects in design, especially when refining the ideas. Having concrete target experiences was considered helpful in gathering feedback and introducing the concepts to end users in relevant and understandable ways. Most importantly, the target experiences helped planning the content and narration of the main demonstrator of the concept – that is, the video.

"*The most educational thing was to make a demonstration video that stands on its own, without any additional information*." (Story Cap)

Considerations for Applying EDD

In addition to the perceived benefits, the case study underlined some things that did not go well, limitations in the setup, etc. that brought up issues to consider when applying EDD in future design activities.

Selection of the target experiences needs to be carefully justified. One should consider on what level of abstraction the target experience is and how well it fits with the intended type of design outcome – i.e., should the design outcome be an interaction device, information content, consequence, a service or what. In industry, a target experience could be linked to high-level and long-term visions in the company strategy or branding. In addition, it is advisable to think about how the target experiences stand in different aspects of the product use and in different phases of the product life-cycle (e.g. long-term experiential

targets like feeling of commitment vs. momentary experiential targets related to how the interaction feels).

Supporting processes and approaches need to be defined. EDD is mainly about determining the overall targets – not about specifically how to reach them. The groups had different approaches in how to utilize the target experiences after the co-design session. For example, some used them to construct measures of success in the user evaluations, whereas some simply utilized them as a source of inspiration. Because of this, a need for a more solid and specified design process was stated. As a member of Affect Me put it: "*Design needs a process, goals, funneling, choosing, and prioritizing ideas. Iterating and re-iterating.*" To complement the approach, the students thought that other methods, such as personas, scenario working and interaction design, are necessary for a successful design process even in conceptual design. In early evaluation activities, it would be helpful if the target experiences had already been operationalized into ready-made measures with which to assess the design outcome in different phases of the development.

One role of having the target experiences can be seen similar to that of many other types of stimuli for brainstorming, such as Personas [3] or VNA-cards [16]. In our case it was found useful to utilize additional stimuli (see Section "Design Process") to complement to the PLEX Cards. For example, concise descriptions of challenges related to winter helped the groups address a broad extent of aspects in the problem area.

When further contrasting with other methods and approaches, we argue that our approach based on EDD and PLEX was a fruitful one. If the target had been a Persona [3], it would probably have been more challenging to 'force' the students think out of the box: a Persona has probably not as much interesting contradictions with the pragmatic winter-related problems as the PLEX has. Personas can be seen as a static, non-changing target, whereas experience is something in which the dynamic and temporal natures need to be considered, too. However, more detailed contrasting remains as future work. After all, as novice designers, the students did not have established personal design practices and habits, which meant that we could not ask them to reflect with other design approaches.

Methodological Retrospection

In hindsight, there are some limitations in the practical arrangements of the seminar that probably affected the design outcomes and processes. In addition to the considerations in the previous section, these can further shed light on how to apply EDD in a successful way.

This case was carried out with students, rather than with professional designers: the motivations are different, there were less restrictions and stakeholder requirements than in actual design cases, and probably also the teachers affected the processes and perceptions on how well EDD served.

Focusing merely on conceptual design in an artificial case on one hand helped focusing on the experiences and creative ideation, rather than, for example, technical limitations. On the other hand, the groups lacked realistic design context with target user groups and contexts, customer expectations, domain and technical restrictions, etc. As one student from the Blinky Hearts put it: "*In real life though, we might be aligned to go for easier way of getting this kind of concept in use by doing it through mobile application instead of physical devices.*"

The co-design session could have been implemented in a slightly different way. The usefulness of the five stages fully depended on whether the team already had a concept in mind or not, and on what level it was (some stages were about creating ideas, some about refining them, some about seeing new points of view). Furthermore, some pointed that the co-design session could have been even more structured: "*another iteration round through the stages could have been beneficial, either during the same session or after a revision of the design ideas*" (SeekThrough).

Regarding the grouping of playful experiences in meta-categories, we found it useful to do that in such an open-ended design problem setting. This allowed more variety in the early phases of the brainstorming and seemed to force to think about more ways to address the design problem throughout the process. The groupings of target experiences varied rather much; some triplets complemented each other very well (e.g. the meta-categories adventure & caretaking), whereas some were on very different levels (e.g. excitement). Nevertheless, the fact that all the three target experiences in each meta-category were more or less present in all the groups' concepts hint that the experiences in the meta-groups were easy to fit together or that the groups wanted to stay true to the given experiences.

CONCLUSIONS AND FUTURE WORK

All in all, we can say that the students' processes of conceptual design were driven by the playful target experiences. The five design outcomes about the same design problem demonstrate a wide spectrum of concepts around interactive technology: interaction devices, social services and mobile applications. The PLEX targets forced the students to consider various facets and possibilities within the extensive scope of moving and navigating in winter. We dare to say that without any other design target than the original design problem the resulting concepts would have been more conventional.

Considering EDD as an approach, we conclude that a target experience in designing product and service concepts can help in (1) guiding and framing the scope of design, (2) inspiring and adding considerations in the idea creation, (3) evaluating the design outcomes against the set targets, and (4) communicating the concept to both internal and external stakeholders. EDD is, on one hand, a *design philosophy* and an *approach* where the design starts off and is centered around specific experience(s). On the other hand, it is a

method that is best used together with a specified design process (e.g. based on the overall process of user-centered design) and provides an additional stimulus to design activities to focus on and be inspired from. We do not argue that it is a new paradigm to supersede, e.g., UCD. Rather, it is a beneficial viewpoint to facilitate any design process of interactive systems, products and services.

Considering PLEX Cards, they were found to serve well as targets that are concrete and specific enough for guiding and helping evaluation and communication but, at the same time, leave enough space for getting inspired. Overall, applying EDD with PLEX is a novel approach, which, based on this case study, seems to be effective in producing innovative designs that well demonstrate the PLEX targets.

In future research activities we recommend extending the design scope from the conceptual design to exploring how EDD could be utilized in, e.g., interaction design, graphical design, design of individual functions, and even design of user manuals. Naturally, to further corroborate the feasibility of EDD as a design approach and applying PLEX in EDD require testing them in authentic design cases that aim at fully functional products or services. Furthermore, it seems worthwhile to explore how to integrate the experience-centeredness with other methods and design targets or requirements – such as Personas, scenarios, user needs and values, and design guidelines.

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