FROM RESEARCH-BASED TEACHING TO TEACHING-BASED RESEARCH AND BACK

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ABSTRACT

This article describes how research-based teaching can be implemented into combined teaching and research activities to strengthen the learning situation and foster new research insights together with raising unforeseen research questions. With a creative mind and careful planning academics can create synergy between research-based teaching and teaching-based research.

The research project, Ludinno, was set out to explore and develop User Driven innovation methodologies by establishing and facilitating collaboration between students from various educations with small/medium sized companies at various locations in Scandinavia. This article describes the research/teaching set up at Aalborg University, Denmark, where the research interest was focused on video in design as an analytic, creative and communicative tool.

The convergence between research questions in the Ludinno project and the learning goals of various curriculums and educations enabled a synergetic constellation that supported students learning, academic research and innovation in the participating companies. Students were offered a learning situation with real problems to address, introduction to state of the art theory and a learning structure inspired by Kolb's learning cycle [1]. This learning situation was also very relevant to the research interests of the collaborators and educators supporting the workshop.

This article argues that research-based teaching cannot only form the foundation for teaching-based research, but these can cultivate each other through intensive and explorative workshops for students, industrial partners and academics.

Keywords: Experiential learning, research-based teaching, teaching-based research, video, design, collaboration, Kolb's learning cycle

1 INTRODUCTION

This paper describes how research-based teaching at the master of Industrial Design at Aalborg University (Denmark), was combined with teaching-based research through a research project called Ludinno. The paper will introduce the Ludinno project and its research focus. Then some reflections about the learning structure will be explained. This will lead to a description of how the workshop was designed to go through four phases: Research, Analysis, Synthesis and Realization. The final discussion will link the workshop outcomes with the initial research foci.

As described above there are three parties involved – each with different motivations, capabilities and responsibilities. Bringing these parties together in a synergetic constellation has been the responsibility of the academics.

1.1 The Ludinno Project

The Ludinno project was funded by the Nordic Innovation Centre and managed by the Swedish Industrial Design Foundation. The project explored and developed User Driven Innovation (UDI) methodologies by establishing and facilitating collaboration between students from various educations with small/medium sized companies at various locations in Scandinavia. The research project supported hands-on UDI-activities with various focal points. This article describes the research/teaching set up at Aalborg University, where the research interest was focused on video in design as a creative tool.

The research project was named, Ludinno, which partly stems from the Latin word *Ludo*, which means to play - together with the word *inno*vation. Ludinno hereby stands for *playful innovation*.

Ludinno has been a hands-on user-driven innovation-project at five locations in Scandinavia – namely in Karlstad, Oslo, Helsinki, Linköping and Aalborg respectively. Each location explored and challenged UDI methodologies through Learning Labs, where people from companies together with students and academics from mostly universities were brought together.

At Aalborg University a workshop was designed involving 12 local companies and four educations. The workshop went through four phases, *Research, Analysis, Synthesis* and *Realization* – a consistent use of video was a requirement to the enrolled students. During the workshop the students were bound to apply video in the analytic part with user observation and problem framing, but also in the generative part with first idea generation and later communication of the concept. Video was thereby the general media or tool throughout the workshop. The utmost research interest was on video' capacities in the different phases and it was a conscious decision to address this with an open and exploratory mindset rather than aiming for answering a specific research question. In the Ludinno project playful innovation was about going through an exploratory design research and generative design process to get the concept right – the goal is to create appealing, useable and useful concepts that people were likely to take into use. The focus of the workshop was therefore on the development of user centred concepts by applying video and working in interdisciplinary collaboration in the fuzzy front-end of the design process with the mantra that - "key to innovative design is an understanding of the user" [2].

2   THE WORKSHOP IN AALBORG

The workshop was conducted over three and a half weeks involving students from various disciplines (industrial design, interactive media, experience design (Aalborg University) and physiotherapy (University College North Denmark)). Hereby the students had different educational backgrounds and very different ways of working. The students were grouped in 14 interdisciplinary groups of 4-6 students to give diverse perspectives on each assignment.

The 12 companies, which were primarily small/medium sized companies, had interest in participating as they were all seeking new UDI perspectives on the products and service they already provided or were considering introducing to the market. It is important to stress that none of the companies aimed at fixed solutions as output, but rather at new perspectives. Some of the companies had likewise expressed an interest in the methodological approach as they are considering changing their traditional ways of working.

The companies were found through announcements in several networks and on the basis of word of mouth. This resulted in a large variety among the companies and the cases they provided. The cases spanned from new interactions styles between television set and its viewers to designing a social experience for food delivery systems for elderly people, and again from designing a more participatory experience for visitors at an Oceanarium to public services that could activate and involve people with social problems. Before the workshop was initiated each case was carefully discussed with the company and some preparations were made. For instance agreements were made with sites for field studies, which meant that the students did not have to worry about the time-demanding organizing activity.

3   DESIGNING LEARNING

The design of the learning situation was highly inspired by Kolb's learning theory and learning cycle (cycle of 'Concrete experience' – 'Observation and Reflection' – 'Formation of abstract concepts and generalization' – 'Testing implications of concepts in new situations'). The Ludinno workshop was designed and facilitated to provide the students with insight into theories of UDI, strategic design and innovation. In addition, guidelines for company collaboration, and more importantly concrete and real life cases form industry were made available. In this sense the learning situation was an iterative constellation where theory continuously was brought into students work on real life cases. Using Kolb's definition, the iterative learning situation was described as "the process whereby knowledge is created through the transformation of experience"[1].

From Kolb's learning cycle it is clear that "In the process of learning one moves in varying degrees from actor to observer, and from specific involvement to general analytic detachment" [1]. The learning structure emphasized the deductive learning style – introducing methodologies and theories challenged students' understanding by requiring them to apply and experience such methodologies in their projects. The organizers' aim was to propose "here and now" [3] reflections on the students

experiences, thus introducing an inductive dimension into the learning design. This meant iteration between theory and practice, reflections and actions was essential to the learning design as "learning is a holistic process of adaption to the world. *It involves the integration of thinking, feeling, perceiving, and behaving.*" [4].

4 ABSTRACT CONCEPTS AND GENERALISATION

Abstract concepts for this part of the Ludinno project are based on existing research foci at Aalborg University, concerning:

1. New ways of including indications and knowledge about users' behaviour, preferences and needs in the early phases of the design process, and
2. The use of video as an alternative representation technique to improve user analysis, communication with users and stakeholders.

The first issue refers to the increasing relevance of a user centred approach in the development of innovative solutions; this in turn, comes from the need to put people at the centre of the design activity and to address user issues, rather than market-oriented strategies. In Scandinavian countries this approach is also inspired by the tradition of participatory design, which aims at involving users throughout the development process to the extent that it is possible [5, 6].

The approach is consistent with new research areas that are considering users as "co-producers" into the development process [7] and exploring the potential for customization and personalization of products [8, 9]. Such an intense involvement of users throughout the production process is the ground for the second research issue behind the Ludinno workshop. The involvement of users as "co-producers" requires a solid understanding between producers/service providers and users [10]. The definition of "colloquial" communication tools is particularly important when final users are not supposed to have any kind of technical knowledge that allows them to read an interpret the traditional communication tools (maps, plants, technical instructions). Among various effective representation techniques, video has been considered as a valuable tool for co-design [11].

The focus on video was also in line with previous research activities at the Institute of Architecture and Design [12]. In those activities video was used in the analytical phase to acquire and interpret ethnographic data. In particular the "video-card game" [13] had been previously used in design research to encourage users' participation in the interpretation of those data.

On the basis of this research background, the research assumptions for the workshop were that:

1. a cooperation between researchers, students and companies could strengthen students and researchers experience on user involvement in the development of innovative solutions
2. video could be used in different phases of the development process to facilitate the communication and cooperation between actors with different cultural and technical background.

5 TESTING THE CONCEPT IN THE WORKSHOP

The workshop was articulated in four phases, *Research, Analysis, Synthesis and Realization,* divided on the three and a half weeks. The students were meeting the companies each week. The first meeting was on the first day of the workshop, when the companies gave the assignment and worked with the group to reach a collective understanding about it. The following meetings were held at the end of each week. In such meetings companies discussed and evaluated the work of the students.

5.1 Research

The first half a week focused on methods for identifying users practices, latent and acknowledged needs and desires. These methods are inspired by the anthropological tradition, but adequately adapted to the time available and the speed of concept development. All field studies were conducted as 'situated interviews' and 'participant observation' [14]. These were carried out by a minor group of students allowing them to divide roles between them: some of the students managed the communication with the users while others video recorded the interview and users' actions.

5.2 Analysis

In the second week the students were required to prepare a workshop in which the collected video material was presented and discussed with the companies. The students were taught and trained in the method 'Video Card Game'[15], and most groups decided to apply this method for the discussion with the company. The ethnographic video material was edited into video snippets [16] – making the video material tangible for the Video Card Game [12]. The students planned and prepared the facilitation of

the workshop. The goal of the workshop was to reach a deeper mutual agreement about the problem or opportunity at hand and the way to address it.

5.3 Synthesis

The synthesis phase was for idea generation and the students were introduced to Video sketching [17]. In the workshop students were asked to use the video instead of pen and paper in the development of their ideas. The students were taught different techniques. The choice and use of the most appropriate technique was left to the students' decision, according to their specific cases and the different level of IT competences. One of the video sketching techniques used by the students was 'Puppet scenarios' [18]. A group of students worked with Lego figures as a mean to generate, test and discuss their ideas. Another group was working on social interaction in front of a television set. The students arranged a living room setting and used these facilities for idea generation, testing and evaluation. The students addressed various themes for instance the direct interaction between the viewer and the television set. Here they found that pressing buttons had poor interaction quality and instead they explored new interaction styles using the advanced motor-skill of television viewers.
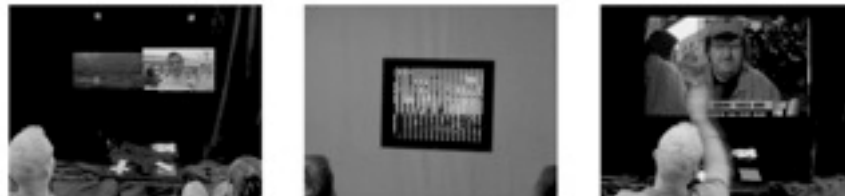

Figure 1. Students generating, exploring and testing ideas using Adobe Premiere Pro

In the concrete example the students were recording their acting out of concepts in the physical setting on video. Afterwards the video was manipulated with television transmissions to match the actions taking in the setting. This acting out approach to video sketching allows designers to enter into reflective dialogue [19] with the problem at hand.

5.4 Realization

The challenge for this phase consisted of finding convergences between the ideas from the Synthesis phase towards the definition of strong concepts. In this phase video should be used to describe the concept in a convincing manner; that means that the video of the concept should be self-communicative and show the pros and cons of the concept. To fulfil this, the students illustrated the addressed problem and an appropriate conceptual solution. The students did not strive for beauty in the concept presentations; this was secondary to well-structured and informative concept presentations.
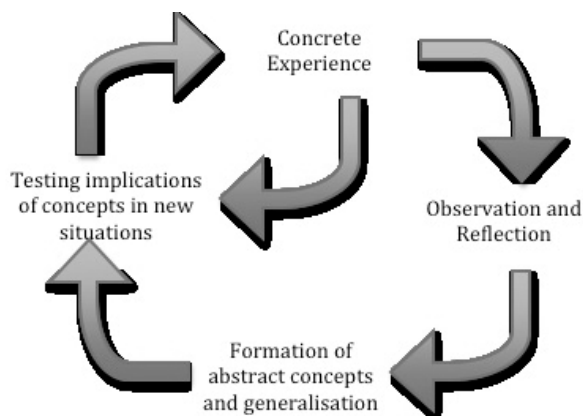
6   THE CONCRETE EXPERIENCE

Figure 2 Iteration of a micro-loop of the Kolb cycle

Every Friday, at the end of each phase, the activity developed in the workshop was proposed to companies and users. In those meetings companies and users were informed about the methodologies and results from the activity in the week and were often asked to participate to some activities, such as the Video Card Game. This was a sort of "reality check" for the students, who could verify their own hypotheses and deductions with the companies. The meetings were therefore a chance to get concrete indications about the validity of their concepts and reflect or modify their concepts in the following week. This generated an iterative sub-cycle within the Kolb learning cycle (Figure 2), which offered an additional dimensions for observation and reflection.

7 OBSERVATION AND REFLECTION

The observation of the activities in the three weeks of the workshop provides indications for new learning and research outcomes. Here below the reflections will be related to the research assumptions specified in the first part of this paper.

7.1 First research component: including knowledge about users' behaviour, preferences and needs in the early phases of the design process

The learning objectives related to this research component were partially satisfied. In the analytical part of the project, field studies allowed students to come in direct contact with users; they visited their working or living environment and followed them in their activities or in daily routines. The research objectives in this phase concerned the use of video ethnography and the Video Card Game.

Video recording proved useful for the discussion with companies' representative, who could gain some new insights on their users. Furthermore the Video Card Game showed valuable to highlight, clarifying or discuss some aspects of users behaviour.

The methodology was not new to the researchers, but the appropriate number of video activities in the workshop provided the possibility to study nuances of and refine the method. Although the method proved useful, the researchers learned that the time spent in analyzing the video was too long and disruptive for the following phase of discussion and interpretation.

7.2 Second research component: use of videos as a tool in all the phases of the innovation development process.

Learning and research objectives with respect to this research component were converging. On one hand the academics wanted to propose video as a working tool to students to verify its usability in terms of rapidity and effectiveness of communication. Both researchers and students learned that video is in fact much more than a simple communication tool. The videos were used for:

- **Interpretation:** the Video Card Game has been used to interpret the video analysis together with users/clients and to identify direction for the concept development phase.
- **Concept development:** instead of pencil and paper students have represented the concept by acting it. Unlike traditional drawings video provide a rich and time-based representation of a concept, including data (e.g. emotions) that could not be easily communicated with traditional techniques.
- **Concept testing** Videos were particularly useful when investigating conditions that were not familiar with the students/designers. Students, for examples, used videos to study how a blind people could use different senses to find his/her way in an unfamiliar environment. In this case video were used to report and discuss the experience of acting the users.
- **Proposing critical views:** The group working on the interaction in front of the television used videos to confront technological opportunities with criteria of feasibility and/or desirability of different solutions, emphasizing emotional and social points of view.
- **Proposing non-verbal instructions to users;** Visual communication is more direct and "natural" than many other forms of communication. This is particularly important in cases in which users and content/information providers do not talk the same language.
- **Providing new information that cannot be communicated with other media:** Several aspects in a design project, and in particular in projects in which time, experience and emotions are critical, cannot be easily communicated through the traditional media (drawings, graphics, and pictures). In those cases video provide additional information that contributes to make sense to a design hypothesis.

Those insights were beneficial to students who learned about the technical and strategic use of video in the design activity; to companies, some of which have considered using this technique to implement the concept and to researchers, who had a chance to explore and extend the scope of video as an important representation tool.

8 CONCLUSION: IMPLICATIONS ON NEW RESEARCH AND TEACHING

The Ludinno workshop has strengthen the learning situation for the involved students and fostered new research insights together with raising unforeseen research directions. In addition the workshop has been used as starting points for new learning loops.

Firstly; the research activity on new forms of representation techniques based on an active involvement of users in the design process have been developed in further projects with private companies and with users.

Secondly; the association of elderly people proposed new funded projects on the use of technologies for the elderly using this approach. A study on the mechanisms of social networks among elderly people has been promoted, with their direct involvement in the simulation of local networks and on the development of a new web interface. Video Sketching has been used for representing and discussing the creation of trust mechanisms among elderly people.

Thirdly; the influence of the workshop on teaching activities consisted in the introduction of prototyping in service design projects in the Master of Industrial design. The Ludinno workshop was carried out again in 2009 and will be run for a third time in 2010. Further plans include a new edition of the workshop for a broader range of educations. The didactic design was also modified to form the basis for Danish participation in the Global Innovation Tournament led by Stanford University.

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