User Oriented Cooperative Interaction Design: a multidisciplinary project course

Yngve Sundblad, Fredrik Winberg, Bo Westerlund, Ann Lantz

HCI Department
School of Computer Science and Communication
KTH
SE-100 44 Stockholm, Sweden
+46 8 7907147
y@kth.se

ABSTRACT
In this paper “case story” experience is presented from development, practice and results from a method and project course on User Oriented Interaction Design. The course is intended for last year Masters’ students from different backgrounds, computer science as well as social science and design disciplines.

The course was inspired by student and teacher participation in the Apple Interface Design Project 1993, 1994 and 1995, when it was established as a regular course at three higher educationa institutions in Stockholm within different faculties. From 2003 students and teachers from the course have participated in the Siena Design Project.

Experience from teaching and practicing methods from HCI, e.g. Cooperative/Participatory design, industrial design, e.g. Functional Analysis, and ethnography, e.g. Contextual Inquiry, is described. Experience and results from project work with user involvement and conceptual prototypes is exemplified and discussed, especially from the perspective of multidisciplinary cooperation. Finally project evaluation criteria and lessons learnt are presented.

Keywords
Education, Multidisciplinarity, Cooperative design, Interaction design, User-centered design, Methodology, Computer science, Social sciences, Industrial design, Graphical design, conceptual prototype.

1. INTRODUCTION
In 1993 I was invited by Apple Computer in Cupertino to participate together with a student group in the Apple Interface Design Project. The initiators at Apple required that the group should be multidisciplinary, with Master’s students from computer science, design and social sciences (Mountford 1995). Altogether nine universities, from North America, Europe, Australia, Japan and India, were invited to show the results of a term project at a joint workshop in Cupertino. We initiated three student projects, one of which was chosen for the presentation. The process was iterated in 1994 with three projects and in 1995 with 4 student projects. That year the course, named User Centred Interaction design, was established as a regular elective course. It is unique in giving credits at three universities in Stockholm: KTH (the technical university), Konstfack (the university college with graphic and industrial design education) and the social science faculty at Stockholm University.

This establishment of a regular interaction design project course, with participants from multiple disciplines, that this way learn to respect each others competences in joint project work, was one of the main goals of Apple’s initiative.
As illustrated in the diagram the course had 427 participating students 1993-2003 (and 140 more 2004-2006). We have been able to recruit students with background in industrial design, graphic design, anthropology, ethnology, psychology, sociology, computer science, electrical engineering and engineering physics each year. There has been some dominance of technology students. In the 5-7 projects with 6-9 students each year we have mostly been able to have the three main discipline areas (design, social sciences, technology) represented though.

As involvement of real users in all phases of development is one of the cornerstones of our (Scandinavian) methodology all projects have involved many potential users. The age and role spectrum of the users stretches from day-care centre children via adults in many professions to old-age people, altogether many hundred.

2. THEORETICAL PART

The theoretical part of the course consists of two separate threads, a series of lectures and a number of practical exercises. The lectures are mainly based on invited speakers giving the students an insight into how different disciplines view participation of users and work with users. Another reason for having these lectures is to give the students a common ground and a basic understanding of how work is actually being done. The lecturers have a background in e.g. industrial design, psychology, anthropology, ethnology, human-computer interaction, computer science, and cinema studies.

The practical exercises give the students practical experience from using different user centred methods. During the years the methods used have varied, from scenario based methods such as Observation & Invention (Verplank & al, 1993) and brainstorming methods such as Future Workshop (Kensing & Madsen, 1991), to the more ethnographically oriented Contextual Inquiry (Beyer & Holtzblatt, 1998) and Function analysis which is a common method used by industrial designers (Westerlund 2002). The focus has shifted from introducing the students to ways of working with and observing users in general, to a more cooperative design perspective using for example design workshops and probes (Gaver & al 1999, Westerlund & al 2003).

The intention is to prepare the students both for creative work and analysis of problems in their design projects in close cooperation with intended users.

3. PROJECT THEMES

Each year, the students are presented a new theme that the projects are supposed to follow. This theme could describe a context, a physical place, an activity or a concept on which the students should focus their work together with the users. The students form interdisciplinary groups and have access to a tutor for supervision during the 11 weeks of project time.

A total of about 75 projects have been performed within 14 themes:


The first example of a project is from the theme is “play across generations”. The design brief described how the students was supposed to see play as an social activity, instead of a rule governed game it should supporting social interplay in a playful manner. The students where supposed to develop a technical solution to support this activity. The result of one project was “TV-mail”, an electronic communication device for elderly people that utilizes the TV and the remote control as interface to support communication between younger people and their older relatives.

![Image of TV-mail project](image)

This is a good example of the user centred and cooperative design philosophy taught in the course, it is the needs and wishes of the users or recipients of the technology that is the main objective. Instead of inventing a completely new technical gadget, the project group worked together with a reference group consisting of people living in, working at and regularly visiting a retirement home in Stockholm, and came up with the idea of using familiar technology to support the social interplay between older people and their younger relatives. By using the TV, many of the elderly people in the reference group did not feel the same intimidation as they do when facing a computer.

The second example, below, shows how the influences of industrial design students influenced the project and the final prototype. The theme that year was Internet and education, and the project that was sent to Cupertino to the Apple Interface Design Project was “Omnicom”. This was a small portable video communication device that was used to “carry” another person around in a remote environment, letting the remote person see what the “host” person is seeing.
and interact with persons that the host is meeting. A typical situation would be a language student being able to share the experiences of the host in an environment, where the language is native, talking with the people the host meets.

During the design phase of the work, the sketching by the industrial design students helped to visualize and to try out different design ideas on how to solve the carrying-around feature of the device. This is shown above together with a more finalised working prototype, built as a follow up for a Telecom fair the year after.

The third example comes from the theme “Rooms in Stockholm”. The project group made an original choice, the underground train station as a “room” and made mock-ups of installation of nice video presentations making the waiting time a bit more enjoyable for the passengers. Illustrated below are the intended site and an illustration from the ground above, preferred by interviewed passengers, to be shown as one of the wall screens at the station.

A fourth example is taken from the theme “Interactive toys for children”. The mock-up below, from the project “Our little orchestra”, intended for making sounds together, was, in spite of its marked but not real functionality, very well received by children at a day-care centre.

The final example, below, shows how low-tech prototypes were used throughout the project in order to communicate ideas and to finalize the finished product. The project group “Braille Pad” designed a reading tool for visually impaired people, which was a small reading device that displayed Braille text when the user moved the device over a surface that represented the screen. The device could also be used to read regular text, by scanning the text and translating it to Braille. To investigate how this device could work, the size and weight of it and the overall look and feel, several different low-tech prototypes where developed in order for the reference group consisting of a number of visually impaired people to be able to try them out and interact with persons that the host is meeting. A typical situation would be a language student being able to share the experiences of the host in an environment, where the language is native, talking with the people the host meets.
impaired people, to try out and give feedback on a whole range of different solutions. Again, the involvement of an industrial design student was very valuable.

4. PROJECT EVALUATION CRITERIA
As feedback to the students about their design projects, and in choosing representative projects for the international exchange, see below, we use the following criteria. These criteria also form the basis for the tutors’ supervision of the projects, combining creativity and analysis.

* Design process: Does the process contain well conceived and motivated decisions? Are the choices of methods well described, well motivated and relevant? Are the users continuously represented in the design process?
* Usability: Is the project solution well adapted to the use situation?
* Internal goals: Are your own goals, as stated in your specification, fulfilled? Have your questions been answered?
* Analysis of the external world: Has the project looked for other relevant solutions and taken a position towards those?
* Theme: Has the project group worked close to the theme of the year?
* Feasibility: Is the suggested solution possible to implement technically within the next couple of years?
* Originality: How original is the solution?
* Finish: How far has the solution been developed towards a finished design/product?

We also give feedback about the different forms of presentation and how well the project group has used those:
* Video presentation (process, result and scenario, 6 minutes)
* Live presentation (10 minutes)
* Web presentation (members, contact information, disciplines, project idea, user centred work process)
* Text presentation (process and result, 8-10 pages)

5. INTERNATIONAL STUDENT PROJECT EXCHANGE
The course was conceived as a response to an invitation from Apple Advanced Technology Group to participate in student project exchange 1993-95 with multidisciplinary student groups from computer science, design and social sciences from universities in USA, Canada, UK, the Netherlands, Italy, India, Japan and Australia. For several days one project from each of about 10 universities was invited with their teachers to Apple in Cupertino, presenting and improving presentations for a public appearance and discussing and sharing experience with the teams from the other universities.

In 1996 we were invited by the University of Siena, which had also participated in the Apple Project, to a similar exchange of student project experience with students and teachers from the Domus Academy in Milan and from an interaction design course in Siena.

From 2003 this has been established as a regular exchange week (“workshop”) in Siena (“Siena Design Project”) with students and teachers from University of Limerick, Royal College of Art in London, Aarhus University, us at KTH in Stockholm and University of Siena. The projects exchange experience and prepare a joint public presentation.

One representative project from us has been selected, based on the evaluation criteria in section 4, for traveling together with some of our teachers to each of these events.

6. LESSONS LEARNT
The mix of competences is very much appreciated by the students. They say that they learn a lot from each other and several say that this course that is the one they appreciated most in their education.

Thus working over disciplinary boundaries can be accomplished, but it takes time, typically a project group needs at least a month before understanding each other’s aspects and respecting all competencies involved. Their involvement in a month of user oriented methodological exercises before start of the project helps in this process.

Establishment of the network between teachers and students from the technology, social science and design disciplines also takes time and has not always been easy. Some years there has been a clear under-representation of one of the intended competence areas.
Keys to success of the projects have been: starting with use and users in their situation, working with concrete content and examples, documentation and reflection over the work process.

Simple technology (e.g. low-tech prototypes) is very useful for illustration and work with users, examples above and below.

The video presentation is very useful both for specification and documentation of process and product in its use. Industrial design competence contributes with concreteness and work process.

The course described here fits well for and is elective both for technology and social science students specialising in HCI and for design and technology students specialising in interaction design.

In our experience, from research and development projects, the two areas can and should melt together as ethnographers, designers and program developers work more and more closely together, in "agile design" (Sundblad & al 2004).

Even though a project course with students from technology, social sciences and design is unusual, and in our case needed involvement of three schools, several universities around the world take up this idea and we strongly recommend others to take up this challenge.

ACKNOWLEDGMENTS
This position paper is partly based on an unpublished position paper to the “Exploring the Relationship between Design and HCI” workshop at the CHI’04 conference, written together with my colleagues Fredrik Winberg, Bo Westerlund and Ann Lantz.

Without all teachers and students, from different disciplines, over the years this experience would not have been gained. The many users involved in the projects of the course should also be acknowledged. Specific thanks go to the Apple Advanced Technology Group, led by Joy Mountford and Harry Saddler, for insight already in the early 1990s that this kind of education was crucial for future quality of HCI design and for the invitation to us and other universities to do something about it. Thanks also go to the group at University of Siena, led by Patrizia Marti and Antonio Rizzo, having invited us to student project exchange in 1996, 2003, 2004 and 2006.

REFERENCES