The shift from user, to learner, to participant: An inevitable development or (just a) mere coincidence?

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ABSTRACT

This paper presents reflections on a shift from the role of a user to the role of a participant among students taking part in a longitudinal project dealing with design and implementation of a mobile learning environment. Over the course of the project the underlying design methodology changed from User-Centered Design (UCD), to Learner-Centered Design (LCD), to Participatory Design (PD). The study indicates that when designing with learners, a combination of design methodologies can be a feasible solution, as it: a) enables researchers' to gain expertise in the target domain, b) develops expertise among students, c) supports the diversity among users, and d) blurs boundaries among the participants. A combination of the above methodologies was found to facilitate the role shift among the students. It is concluded that PD, alone or in combination with other approaches, appears to be suitable for designing learning environments, while its time requirements might mean that existing PD methods need to be modified to be applicable in commercial software development.

Categories and Subject Descriptors

D.2.1 [Requirements/Specifications]: *Elicitation methods, Methodologies, Tools*
D.2.2 [Design Tools and Techniques]: *User Interfaces, Modules and interfaces*
H.5.2 [User Interfaces]: *Prototyping, User-centered design, Evaluation/methodology*
K.3.1 [Computer Uses in Education]: *Collaborative Learning and Distant learning*

General Terms

Design, Human Factors, Theory, Performance.

Keywords

User Roles, User-Centered Design, Learner-Centered Design, Participatory Design, Learning Environments.

1. INTRODUCTION

Education is currently one of the main areas for application of information and communication technologies (ICT) in society. However, technologies developed specifically for education (as opposed to general purpose tools, such as word processors), have hardly had any impact on education [3][9]. The main reason why the potential of educational technologies has been largely unexplored appears to be a radical dissociation between the design of technologies, on the one hand, and development of educational practices, on the other hand. The design has been typically technology-driven and either oriented towards the most elementary educational activities or based on a completely new perspective, which does not fit in with existing practices [18]. These perspectives have also affected the design methods, which have been constructed from the viewpoint that the learning setting is something that is well defined, procedural and well structured. As a result, new technologies are seldom integrated into real-life education. Educational practices and everyday interaction patterns among students and teachers are not considered which can cause constraints to pedagogical innovation and creativity in the learning environment. A current direction has been to consider a more student-centered design focus, where students and teachers more actively participate in the development of the learning environment [13].

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1.1 User participation

In the 1980s when computers became more powerful and prevalent the issue of computer usability became a pressing problem. The importance of including the users in the development process were stressed in studies as User-Centered Design (UCD) [14], developed to take into consideration actual work practices to achieve effective designs e.g. [8]. The need to gain understanding about the users and their work context, stresses the significance to early focus on users in interactive system design. Within UCD the focal point is to deal with problems developing a real understanding of the diverse contexts of use. The activities are focused on understanding the usability needs of the user as a way to advise and influence design [14].

Learner-Centered Design (LCD) is a challenge for developers to move beyond usability issues. It explores the challenges of developing computer systems that support people in a learning environment, i.e. the learners' development of expertise in new and unknown work practices [17]. LCD was developed as an argument to the UCD framework with the goal to help learners (novices in a given work practice) to learn new work. The unique needs to be addressed when designing to support learning within LCD are *diversity, motivation* and *growth* [15]. Learners might not share a common culture or level of expertise in the work practice, and this diversity must be taken into account in the developing process. One LCD aspect named is the conceptual gap

between learner and work. Instead of the gulf of execution and evaluation [14], which is centrally addressed in traditional UCD, the conceptual gap can be explained as a gulf of expertise between the learner and a model of expertise embodied by an expert in the work practice [15].

Participartory Design (PD) is arguable the single most important contribution of Scandinavian researchers to Informatics and related areas. Within Participatory Design users' perspectives of the present and future settings serve a more substantial role and are a significant part of the process. During appreciable time users are included as participants in design, which enables the exchange of skills, values, perspectives, expectations. The basic principles of PD have been elaborated into a set of requirements, needed to fulfill designs that support the actual work process [6][12][16]. Though its underlying concepts, principles and values are considered sounds, it is considered widely impractical, and is hardly ever used at all in commercial software development. The lack of support in existing methodologies whilst developing learning environments, calls for development of more advanced, new or modified, methodologies [7][15]. This paper presents an impact employing different design methodologies on the role of users (i.e. students) taking part in design of a mobile learning environment.

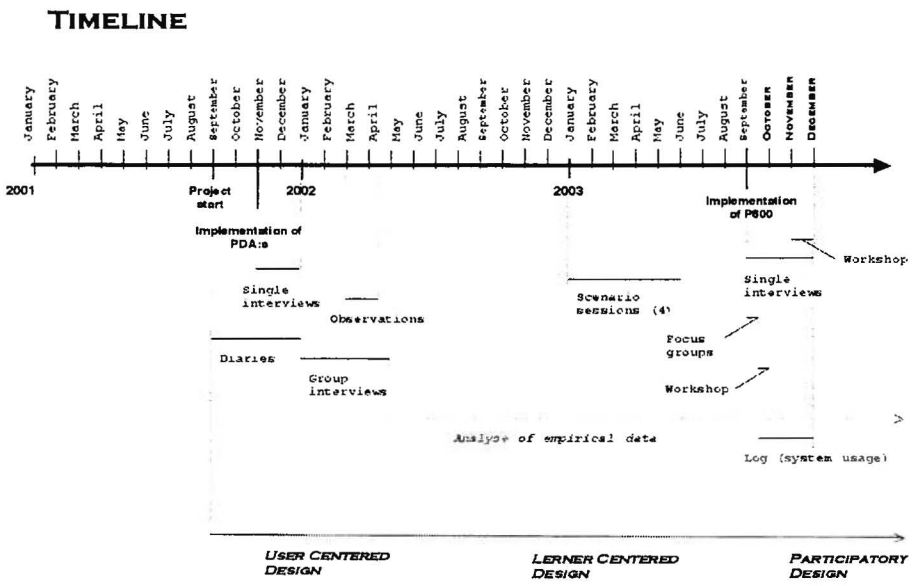

Figure 1. The figure presents a timeline over project activities, such as: methodological approaches, applied techniques and implemented mobile technologies.

2. DEVELOPMENT OF A LEARNING ENVIRONMENT

The data presented in this paper is generated from a longitudinal study of design and implementation of a mobile learning system (Figure 1). The project work has been influenced by a student-centered approach and since year 2001 directed towards understanding of mobile technologies and their use in the social context of distance and decentralized education. The research method in the project has followed an action research approach [1]. The overall aim has been to understand what happens in a learning setting when students, teachers and researchers in collaboration, design and use a mobile learning environment.

The design team consisted of researchers, teachers, designers and students. The students freely participated and were off-campus students within higher education, with good or very good knowledge of personal technologies. Observations and user meetings were video and audio-recorded with the students' permission, and complemented with field notes taken by the researchers. Observations of processes were made through ethnographical techniques, e.g. observations, interviews, video recording, focus group interviews etc. The researchers also became more actively involved in the setting as participant observers since they intervened in the setting through workshops, scenarios and implementation of mobile devices (Figure 1).

The first conducted study focused on communication patterns among students, their exploration and practice of personal Information and Communication Technologies (ICT) [10]. During spring 2003, conducted studies focused on present and future learning contexts [5] and during autumn 2003 the focus was on design of the system, i.e. the learning environment. Within project an interface was developed, supporting both mobile and stationary interactions [4].

2.1 Exploring the concepts of use

The initial design approach was to gather expertise of the target domain through the support of UCD. The first phase of our study applied ethnography as the main data collection method (Figure 1), with the aim to understand existing communication patterns and the use of mobile artifacts among the students. Each student was asked to keep a diary recording to whom and when and by what media they communicated. Single interviews, complemented by group interviews, rendered data to be cross checked between dairies, single and group interviews. Observations were used to capture the adoption process when a PDA and a mobile phone module, was distributed to each student [11].

2.2 The necessity to expand the scope

Within LCD, scenarios are brought up to encourage learners to explore and explain their behaviour, by e.g. addressing future

settings and work practice [15]. Experiences gathered from previous observations and interviews were combined with the teachers' model of expertise of the future learning setting. The written scenarios, introduced and presented to the students at four scenario sessions (Figure 1), were narrative designed to incorporate a presentation of future setting (vision learning scenario) made by the teachers and researchers, the ICT support to educational task performance (learner interaction scenario) made by the designers and researchers, and finally at a close by letting the students design the final scenarios (learner written scenario) that they later presented orally to the teachers, designers and researchers. The learner written scenarios rendered a checkpoint for e.g. researchers, if presented ideas were correctly understood. Each scenario session included three groups of three to five students.

2.3 An evident development towards Participatory Design

As early user meetings within the project demonstrated the possibility of mutual understanding between designers, learners and pedagogical experts, which is the essence of PD, a transition from LCD to PD seemed evident. The first workshop (Figure 1) was organized, where students and designers were divided into three parallel groups of five to six participants (students and one designer). The first operational version of the system was presented to the students approximately one month earlier, concurrent as implementation of a new technology. The students had a more prominent role than the designers in the workshop, as designers were expecting to be confronted with their views and reflections. Students' proposals to improvements were merged together with designers' implemented decisions of the interface. After students' suggestions, a decision was made to complement the mobile interface with a stationary interface. Two months after the first workshop, a second was performed. This workshop correspond more with the form of member activity that PD advocates. Two groups, consisting of four students and one designer, worked in parallel. Group A worked on the stationary PC interface, and group B on the mobile interface. Approximately after one hour, the groups shifted interface. Finally, the groups were merged into one, which worked with both interfaces.

2.4 A summary meeting

Three months after the last workshop, all participants (students, teachers, researchers, designers) met at a summary meeting. With the timeline as the starting point, three groups of seven to eight participants, discussed the project and its results.

3. THE SHIFT FROM USER, TO LEARNER, TO PARTICIPANT

UCD was used to inform design and to gain an understanding of the students learning context and to give the designers means to ensure students' future needs [11]. In the presented study, the students initially had the role of an informant, as we observed and documented their present usage. At the summary meeting, the students also stated that they initially experienced themselves as a *source* of information.

When present context was outlined, the reflections of future needs were at aim, and the need to apply new techniques was legible. As students are not familiar with the future setting, we needed to support them to connect present needs to future learning setting. Learners as individuals have different focus on needs and opportunities and the scenarios functioned as a guide in development, conveying and developing visions of how the new technology could impact their interaction. The scenario sessions supported the students to reflect upon individual avails and others' needs, also further support for the informal study group. The scenarios were iteratively composed; enabling the students to recognized their comments from earlier session and therefore able to grasp their contribution, and by that it supported their motivation to contribute. The students stated that these group meetings were to them most beneficial, as it was a possibility for them to present their own ideas and reflections, at the same time as they interacted with the others' ideas and experiences of usage. It supported them in learning from each other and to understand the heterogeneity among them, to see suggestions that might not be useful for them personally, but useful for others [5]. Our narrative scenarios seemed to support the diversity within the student group. Another interesting result was their conceptual shift: not only did they reflect on future possibilities, they also reflected on their task performance, and changed how they e.g. collaborated. They identified and reflected upon benefits and problems in their present collaboration method.

The *growth* of the students, supported by the LCD approach, in combination with their knowledge of technology use and collaboration methods, render possible a shift in their role. As the iterative process of scenarios also rendered a development among other participants (researchers, designers, teachers) to understand the students' views and suggestions, the shift towards techniques supporting participation and interaction of different users, seemed evident, and the decision fell on workshops. The students stated workshops to be a more interesting form of contribution and participation. They felt that finally they could *interact with the designers* and directly see future design possibilities and constraints. A fundamental assumption of design and its relation to user and use, presented in [2], is that

"The practice of the user is the starting point for design. At the same time users need to be confronted with, and to experience new ideas in order to transcend their own practice." ([2], p.12).

The students contributed with many suggestions about the design of the interface as they became more and more experienced with the system. But they also stated that the usage of workshops early in design might not have been so fruitful, since they thought it was hard to state real future needs. At the summary meeting the students reflected upon their contribution and stated that they had felt a shift in the project: that their role had changed, partly because the change of user meetings, but also as they became more close to other project participants (teachers, researchers, designers) and as they more and more experienced the future setting and gained knowledge of the developed system. The time span of the project, made it possible for the students to reflect on their contribution at different stages. They noticed that some of their initial suggestions regarding systems functionality were non-useful or non-needed. Their limited knowledge, they stated, did not allow them to contribute as participants during the first user sessions, and therefore they welcomed the slow development of their roles.

4. CONCLUSIONS

Teachers, students, designers and researchers have all made impact on the design of the learning environment. Researchers,

teachers and designers grasped a greater understanding of the students' views, and vice versa, through the scenarios. Interesting is that the differences among the participants blurred through out the session meetings, which rendered all to be able to meet as participants. In this paper the shift among the students was presented. In relation to this case, some benefits and challenges with applied methodologies were illuminated.

4.1 Benefits and challenges associated with applied methodologies

- UCD can facilitate the expertise among the designers of the target domain and of the expectations and present needs among users. But it cannot support the student in presenting significant suggestions of future needs, as the future setting is unfamiliar.
- LCD supports the diversity among users as it a) renders the shift from learner to expert, b) facilitates the heterogeneity among participants and c) supports reflection on present and future learning setting. But LCD does not support interaction of participants when the learners have, partly, or fully, bridged the conceptual gap and developed their understanding of the future learning setting.
- Development of students' knowledge and expertise supports a shift towards PD. PD enables participants to meet as equal partners and share each other's expertise. As the learners are participating throughout the whole design process, there is a possibility for them to reflect upon their own suggestions in relation to others, and vice versa.
- The shift can also be seen as problematic, as there is no possibility to relate to one single method during the whole design process. The time this combination of methodologies claims makes it highly impractical to use in practice.

Presented case supports the usage of applied methodologies during design of learning environment in a longitudinal project; time is still a challenge in shorter projects of design. A more thorough analysis of collected data, together with further research, is necessary to formulate suggestions for development of new methodologies that can be applied in shorter projects performed in commercial software development. Based upon the assumption presented in [2], a conclusion can be drawn that a "pure" PD approach in presented case, would have been useful. This is further supported by one basic assumption in PD: to provide participatory rights to all [6], which was the case in presented study. All participants: researchers, designers, teachers and students, participated at the concluding summary meeting. Therefore the shift of roles among the students seems to be an inevitable development, rather than (just a) a mere coincidence.

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