Child-Centered Game Development

Abstract
Children represent an important and ever-growing target group of the game industry but nevertheless up to now children are rarely involved in the development process. In this paper we aim to introduce child-centered game development (CCGD) approaches for user-centered design (UCD) for the context school building on suitable HCI and educational pedagogy approaches. The CCGD approaches illustrate how to guide the involvement and participation of children in school classes in the development process of games. Approaches for the analysis and concept phases were developed and will be presented in this paper.

Keywords
User-centered design, child-computer interaction, game design, education pedagogy

ACM Classification Keywords
H5.2. Information Interfaces and Presentation (e.g., HCI): User Interfaces (User-centered approach, Evaluation/methodology)

General Terms
Design, Human Factors

Introduction
The reasons why children play games are manifold and the ways how they play are different. Children's enjoyment is the most important goal for games. If children do not enjoy the game, they will not play it [10]. For game designers, it would thus be an advantage to work together with children to satisfy their range of desires [13]. Children as an important target group of the game industry are rarely involved in the development process. For doing research with children four ways of involvement have been identified:
children as objects, subjects, social actors and as participants or co-researchers [7]. In the child-centered game development (CCGD) children are participants and therefore embedded in the different research activities in the context school. Children as participants will take over the role of a user, a tester, an informant and a design partner [5] in the UCD phases.

Working with children is twofold: On the one hand they come up with creative and innovative ideas; on the other hand many of their ideas are technically unworkable [12]. Nevertheless, following the principles of UCD, the creative and innovative ideas should be used for the development of games. In the context school there are further issues that have to be considered: The organizational structure of schools necessitates not only the involvement of the children but also of their parents, as well as teachers, principals etc. [1] Furthermore, children need to get familiar with the researcher to work in a confidential setting [8]. This is easier for children in the school context as they are used to adults being around them as helpers.

Within this paper we will first describe the CCGD approaches, which are applied in the context school, and in the end we will highlight the overall experiences with the CCGD.

**Child-Centered Game Development (CCGD)**

As there are only few methodological approaches for child-centered design available, and even less for the development of games with children, we aim to introduce some CCGD methodological approaches. The approaches will be developed for the analysis, concept, design, implementation and evaluation phase of UCD applicable in school classes (e.g. during project days).

**Linking educational pedagogy and HCI**

Educational pedagogy refers to the significance of group dynamics while working with groups of children [2]. Focusing on group dynamic processes has positive impacts on the children’s motivation as well as the development of creative solutions. Through putting the users in the center of the design process (i.e. UCD) and supporting group dynamic processes not only single ideas but group ideas are encouraged that are discussed and initially evaluated by the group.

In the following possible approaches for the analysis and concept phase will be described, explaining the modification of the educational pedagogy or HCI methods, their application and output.

**Analysis phase**

**IDEA CYCLE**

The goal is to get an understanding of a topic by creating and discussing ideas in a group. The idea cycle is a modification of the world café method [3] (also called knowledge café). In order to work with 10 to 14 year old children it is necessary to reduce the complexity. Thus, we set up groups of 4 pupils. We prepared 5 posters with different questions or statements according to the topic we wanted to discuss which were arranged in the classroom. Each group was then asked to write down its ideas on post-its in order to answer the questions. Using post-its allows discussing, arranging and re-arranging the ideas (see figure 1). After every 10 minutes the groups rotated until every group gave input on each poster. The advantage is that the children do not only mention their spontaneous ideas but also evolve ideas out of the others.
W-QUESTION CARDS FOR GAMES
This approach aims at figuring out questions to investigate a topic. Using W-questions (Who? When? What? Where? etc.) is common in educational settings, e.g. for learning grammar [6] or for comprehending stories [4]. For the analysis phase the children were defining W-questions for collecting end user requirements and giving exemplary answers. The children were given cards (see figure 2) with a question word to animate them and they had to write down questions in order to get answers on the end users’ behaviors, needs or preferences. The advantage of this approach is that the questions are therefore authentic, as they are phrased by children and also address children.

SHORT FEEDBACK QUESTIONNAIRE
The goal is to evaluate the children’s perceived fun e.g. of games or game controllers. The short feedback questionnaire builds on the one-page, pre-structured questionnaire used to evaluate the factor fun [9] in games and consists of four parts (see figure 3): 1) the question “How much fun does the game controller make?” (“funometer”) [11], 2) select pre-defined aspects to describe the game controller (e.g. easy/difficult, fun/boring, simple/inconvenient) and 3) age and gender. As the questionnaire is easy and quick to fill in the children do not lose patience filling more than one in for several game controllers.

CONCEPT CREATIVE THINKING
The concept creative thinking approach builds also on the brainstorming method [14]. The different parts of the game idea booklet are refined for one idea by brainstorming in small groups of 2-3 children on one topic (see game idea booklet). The different alternatives are presented in front of the other groups and agreed ideas for the game concept are noted down on a poster.

Conclusion
The CCGD approaches mentioned above were successfully applied to develop mini-games with pupils between 10 and 14 years in the context school. In the following, we highlight the most important experiences:

- It is essential to give an introduction with clear instructions in front of the class to reach the defined goal. While the group work phases there is the need to provide ongoing support for each group. As soon as the children know what to do, they are very creative and produce many interesting ideas.
- In order to motivate the children each task should consist of sub-tasks, topics, questions or explanations if the terminology is not age-appropriate.
- Small groups of 2-3 children are most suitable for the CCGD approaches and have the advantage that less time is needed for e.g. brainstorming but nevertheless the benefits of group dynamic processes are not lost.
When working with children it has to be considered that they get bored faster than adults and require variations. Thus, the CCGD approaches should not last longer than about 30-40 minutes to have the children concentrated throughout the whole process.

Overall the CCGD benefits of the combination of multidisciplinary approaches that support the game development process with children in the context school.

Future Work
For the design, implementation and evaluation phase further CCGD approaches will be elaborated for the context school. All approaches together will result in a CCGD framework.

References


