What Would the Parents Like to Know About Children but are Afraid to Ask?: Designing Reports about Child Development in Online Games

Abstract
Nowadays educational games constitute a large part of the learning environment. These interactive forms of education enable children to develop various competencies and also provide feedback depicting their strengths and shortcomings. Currently, portals offering educational games provide such feedback mainly to children. Surprisingly, a parent, who is responsible for a proper development and education of a child, is usually not included as a recipient of information about the child’s results tested through games. Therefore, the goal of this preliminary study was to investigate the informational needs of the parents that can be applied to educational online games for children of age 6—9.

Keywords
online games, educational games, information needs, parental feedback

ACM Classification Keywords
H.5.2 User Interfaces: Graphical user interfaces, User-centered design. H.3.5 On-line Information Services: Web-based services

General Terms
Design, Human Factors
Introduction and related work
The needs, the opportunities and the benefits of educating children through games are recognized by many researchers and game designers [2, 3, 4]. Thus far research focus has been directed towards the aspects regarding the development of motoric, cognitive and social competences [5]. Verhaegh et al [5] have shown that social competences could be built up according to the notion of Ambient Intelligence [6, 7], which implies a smooth transition from playing to learning without compromising the experienced fun and educational effectiveness. Playground Architect [9] is an example of an educational game which, by offering experience of completing group tasks through giving instructions to other players, taking a high level decisions and approving works, helps shy children to gain social confidence.

Another aspect frequently investigated by related research [i.e.: 9] regards the application of tangible interfaces to develop motoric skills and to lower the unintended physical load for children. Examples of tangible games combining the development of social and motoric competences are Head Up Games [10, 11]. They combine virtual gaming elements with physical objects placed in the real world and in such a way form an active and collaborative way of playing and learning.

Although the majority of research efforts primarily focus on children, parental needs were considered when designing TagTiles [5], a game console transiting a child from free play to completing tasks given by a teacher and validated by a parent. The motivation to include parents into play also formed a basis to design Age Invader [12]: an integrated family entertainment system that focuses on physical and social interactions using mixed reality floor system.

Educational games often provide feedback depicting strengths and shortcomings of children which enables them to reach mastery in a given topic. Nevertheless, in any of the above described solutions no feedback aimed to inform the parents about child’s skill development was offered. Exceptionally, portal Funschool [1] provides ideas and hints for family activities and forum for teachers and parents to discuss child development. However also there no opportunity for registering and analyzing the results children obtain in games is given. In this view we set out a preliminary study aiming to investigate what kind of information parents would like to obtain through educational games for children of age 6—9, and what form such information should take. We chose to focus on the online games as they are currently the most widely spread supportive tools for educating children.

Workshops
To address our goal three participatory workshops were conducted. The first workshop focused on compiling a list of competencies that could be developed through online games based on the knowledge from the field of child psychology. The second workshop focused on eliciting informational needs of parents regarding the overall development of their children. The third workshop aimed to connect the elicited needs to the relevant competencies and select those needs and competencies that could be evaluated through online educational games. We chose such an approach for two reasons. Firstly, the participatory research methods gave us the opportunity to leverage the tacit knowledge of participants as they got engaged in the subsequent exercises. Secondly, participatory techniques gave us the possibility to elicit rich stories about participants’ successes, failures and challenges regarding raising
Workshop 1
The goal of this workshop was to elicit competences that could be developed through online educational games. Participants (3 male and 3 female, all parents) included: three experienced child psychologists (age 35–45) and three experienced game designers (age 30–35). The workshop consisted of:

1. Introduction and warm-up.
2. Defining a list of competencies that can be developed through educational games.
3. Categorizing competencies to form an initial competency model.

During the warm-up participants introduced themselves and shared memories of their favorite childhood game and of their first exam. In such a way we aimed to motivate them to explore various evaluative aspects of different types of games reaching beyond online gaming. Participants discussed physical games like team ball playing, board games, computer games, brick games (Lego) and also self created games such as building decorations for a doll-house. Next, participants were divided in pairs of one designer and one psychologist. Each pair was asked to create a list of competencies that could be developed through the different types of games starting from the list of games discussed earlier. This exercise led to enlisting 57 unique competencies. These competencies were then jointly discussed with all participants and divided among three categories of competencies proposed by Verhaegh et al [5], namely: cognitive, social and motoric skills. The competencies were assigned as follows: 35 to the category of cognitive, 16 to social and 5 to motoric skills.

The workshop was concluded by affinity diagramming exercise using the Conventional Analysis method [13]. This type of analysis is used in qualitative research and allows for identifying recurring trends and patterns that are built bottom-up by grouping similar statements in categories and sub-categories. Also the relations between the identified categories and subcategories were visualized, indicating the groups of competencies, which could be examined together in games.

Following the workshop, the results were analyzed and a preliminary model (see: Fig. 1) depicting the different types of competencies that could be evaluated through educational games was defined. It included 57 competencies pertaining to: cognitive, social and motoric skills [5] divided across 9 subcategories: relationships (19 items), senses (4 items), memory (1 item), logic (2 items), adaptation (17 items), concentration (2 items), creativity (6 items), space (4 items) and reflex (2 items). We further defined the following insights regarding the evaluation criteria for educational games: i) a child should be evaluated relative to oneself and not in comparison to other children; ii) a child should not be criticized: rather its effort and efficiency as well as the skills and capabilities should be highlighted; iii) the assessment should restrain from judgment and should aim at motivating a child and parents to work on the highlighted areas.

Workshop 2
The goal of the second workshop was two-fold. Firstly, we wanted to identify parental informational needs regarding the competency development of their children. Then we wanted to capture the expectations of parents regarding the goals and the structure of an evaluation report provided by online educational games. Participants (1 male and 5 female, age 30–45)
included: three full time working parents (company owner, economist and game designer), two part-time working parents (psychologist and freelancer) and one full time parent. The workshop consisted of:

1. Introduction and warm-up.
2. Defining a list of parental informational needs regarding the competency development of a child.
3. Categorizing the identified needs in the context of the competency model defined in Workshop 1.
4. Visualizing an exemplary evaluation report aiming to present child results to the parents.

In the warm-up session, participants were asked to describe their reactions to situations, in which their child failed and succeeded. It was aimed to motivate them to better understand their informational needs regarding an evaluation of child competency development.

The next exercise aimed to elicit parental needs by stating the following question to the participants: "What would you like to know about your child?". Each need was written on a sheet of paper in a form of one-sentence answer to the above question. After providing the statement, the paper was folded to cover the text and the sheet of paper was handed to the person sitting on the right. In such a way we ascertained the anonymity of the answers which allowed for free and unfettered expression of various needs.

As a result 43 parental informational needs regarding child development were identified. These needs were then categorized using the Conventional Analysis method [13] in which the needs perceived as similar were clustered together in a form of an affinity diagram. A total of 22% of all needs regarded information about child’s feelings and emotions; 19% the development of child’s cognitive skills; 19% information about the relationship with the parents; 16,5% information about the types of tasks performed in the game; 16,5% information about relationships with peers and 7% regarded immersion into the game.

Finally, participants were divided into two groups and asked to draw an evaluation report they would like to receive (see: Fig. 2). As input they used the previously identified list of parental informational needs together with the table of competencies identified in Workshop 1 (see: Fig. 1). The proposed reports were analyzed after the session and a model depicting three levels of information was defined:

- Level 1: a visual report for which the parents could define different types of required information. The default view should deliver basic information about child development without requiring effort to delve into the report’s structure. The detailed view could support selecting and further analyzing specific information recorded through the game.
- Level 2: a statistical report presenting all available data regarding the child attained through the game.
- Level 3: access to the community, where parents can seek advice regarding child development and participate in online discussions with other parents.

The results further indicated that it was perceived as desirable that the first and the second levels of the report also contained additional information such as: average level of success in the game achieved on the standards for child development at different age, the portal and additional information about the game itself (the type of the game and the average playing time).

Workshop 3
The goal of the last workshop was to assign parental informational needs with the areas of competences, which evaluation may provide answers to those needs.
Participants (3 male and 2 female age 25—35) included: one experienced child psychologist, two game designers and two parents. The workshop included:
1. Introduction and warm-up.
2. Prioritizing the informational needs of the parents.
3. Assigning competencies with the prioritized list of parental informational needs.

After the introduction, participants were divided into three groups. Each group received a list of parental informational needs elicited during Workshop 2 written out on separate cards. Participants were asked to arrange these needs according to the three levels of importance: those considered as of high importance, those seen as important but not crucial, and those assessed as unimportant in the context of child evaluation through games. Then participants were given a second set of cards containing the competencies defined in Workshop 1 depicted by Fig. 1. They were asked to assign these competencies to the parental informational needs indicated as important in the previous exercise. This exercise led to creation of three lists of competencies that could be tested through online educational games matched with parental informational needs.

The obtained results were analyzed after the session again using the Conventional Analysis method [13] and one prioritized list (see: Fig. 4) of informational needs was defined. It included 35 needs, prioritized according to three levels of importance: highly important, important but not crucial and unimportant, divided across six categories: the development of game specific skills, tasks performed in the game, child position in the group and relations with peers, the state of the relationship with the parents, the balance in engagement in the real and the virtual world and the emotional state of a child.

**Discussion, future work and conclusions**

The goal of this study was to investigate the informational needs of the parents that can be evaluated through online educational games aimed at children age 6—9. To achieve this goal, three workshops were organized with psychologists, game designers and parents. The study showed a discrepancy between the opinions of experts and parents regarding the parental informational needs about child skill development (see: Fig. 3). Psychologists focused their attention on the cognitive competencies, such as spatial imagination, planning skills, creativity, etc. They also identified motoric skills such as dexterity or coordination as important to evaluate child performance through games. The parents paid attention to the cognitive, emotional and social development of a child and entirely omitted the motoric skill development. The most important for them, however, was information regarding how well the child coped with tasks and challenges imposed by the games. Parents also wanted to understand the relations their child had with others (both the parents and peers). Finally, it was important for the parents to see how well the child was able to differentiate between the real and the virtual world created by game. Psychologists’ opinion of parental informational needs seems consistent with the educational standards used to evaluate children in learning environments. At the same time it has been observed that the informational needs of the parents appear to go beyond these educational standards and include aspects pertaining to the emotional well-being of a child. Combining both sets of data will allow portals...
offering educational games to create a balanced report helping the parents not only to become more aware of the value of games in the overall development of a child but also to provide a new communication channel. It is desirable that such an evaluation report should take up an easy to use, intuitive and customizable form to satisfy parental needs providing three levels of delivering information: i) interactive visual report; ii) automatic statistical report and iii) access to the community of experts and other parents. At the same time it is crucial to help the parents to realize that such a report should only be a stimulus, hint to what parents should observe and what to focus on in such a way leading to create a new means of communication and better understanding between the generations.

The above results are currently used as guidelines to implement an online portal offering educational games for children age 6—9. The portal aims to stronger involve parents in the competency development of their children. As the next step we plan an evaluation of the proposed reports using the working system which will take place in September 2011.

Acknowledgements
This project was financed by the Polish company HomoDoctus. We would like to thank the Aleksander and Magorzata Soleccy for their extensive help and also all participants for their engagement in the study.

References