Co-discovery Method and Its Application with Children as Research Subjects

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Abstract. The abstract should summarize the contents of the paper and should contain at least 70 and at most 150 words. It should be set in 9-point font size and should be inset 1.0 cm from the right and left margins. There should be two blank (10-point) lines before and after the abstract. This document is in the required format.

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1 Introduction

Clickable areas in computer interfaces can be defined as those areas in where it is allowed to press or select using a pointer and, from this action; the user is guided to another area of the system [1]. Graphical representations for clickable areas in computer interface should enable mental representations that help understanding navigation system during the cognitive process. Otherwise, the user may feel a sense of being lost. This concern must be present in interactive educational system development.

Hypermedia environments are frequently present at Education. Flexibility and non-linearity of these systems has been seen as causes of misunderstanding and disorientation of its users. Due this, many times users are not capable to know *"where"* they are or *"where to go"* inside the system [2].

The participative aspect of interaction within a graphic interface can be essential to motivate children to continue the system´ usage. Users that can´t interact with an interface will soon lose the interest in it [3]. This reaction can be justified by the fact that a succeed interaction, in an environment based on hypermedia , presenting a non-linear manipulation join different data from time and culture, in different formats and possibilities of expression, allowing the customization and promoting the user participation [4].

According to these assumptions, the main problem of this research is: how the graphic elements' design that represents the navigation system can influence cognitive processes? And how it also influences performance in educational sites for

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children tasks? Trying to give some answers to this problem, navigation was taken as the research focus.

It is important to notice that this research not focused on the visual language of the elements that are clickable areas (e.g., as color, typography and proportion). The focus was the paths performed by users in educational websites, indicating the design importance in such interfaces areas of these systems. Nor did the research's scope was to evaluate if children were able to learn the contents presented in the interface.

2 Methodology

To achieve the research objectives both quantitative and qualitative data were collected considering user's mental model structure, influenced by the graphic representation of the pre-selected clickable areas in a children's educational site. Later, users models aspects were compared to system selected usability models.

The website chosen as the object study was *Kiagito* (http://www.edukbr.com.br), which part of *EduKbr* portal (http://www.edukbr.com.br) with offers interactive activities to be developed in Elementary school's classroom. This portal is supported by Microsoft in Brazil.

Considering the characteristics of main users of these interfaces – children from 7 to 10 years were set for survey. Although we know that are differences in development levels between children at these ages, it is the same division adopted by the Brazilian Government for children at Elementary School.

From these considerations, the survey was divided into two phases: exploratory and participative. Exploratory phase consisted in interviews with Education experts, teachers and designers about interfaces for children and the *Kiagito* website. Participative phase was an evaluation with navigating this same website.

This paper will present only results of participatory phase in which was used the Co-discovery method. The idea of using the method was also it allows children participation' according their understanding and their behavior about while navigating in the website. At the same time, according to literature review this method allows to obtaining systematic and relevant information.

2.1 Co-discovery: Choice and Applicability

In this research the choice of this method to verify whether the clickable areas design in this website are in accordance with children mental models, considering navigation performance during a predetermined task execution.

As subjects in this phase children were selected and organized into seventeen pairs who were already known each other. All subjects are regular students at elementary schools, has computers at home and internet access, some experience in using computers and but never visited *Kiagito* website before.

Children were asked to perform the task "create the *Clubinho* card" at the *Kiagito* website and they were encouraged to verbalize their impressions of each step in the navigation system.

Fig. 1. Kiagito homepage with the main menu

This chosen task involves finding the provided label on the main menu (Fig.1), and from this, does the activities for creating the card, such as to fill out the registration form and to create his portrait illustration (Fig.2). Thereafter, the pair was confronted with another navigation menu to view the *Clubinho* card finished (Fig.3).

3 Results

From obtained navigation data, after the task to get the "card" as a *Clubinho* member some details can be pointed out:

* All the children could recognize the menu and pinpoint the necessary information (*Clubinho* tag) to carry on the task: all actions were inside *Clubinho* section;
* Total time of navigations ranged from 3.26 sec to 16.35min. This result was related to the period of participation of each couple, not considering if they concluded or not the task. This wide variation is justified by the creation of the "portrait" which stimulates a big conversation between the kids;
* Children couldn't understand why they should fill in a database – the majority was really agog to navigate and know better the system;
* The *Clubinho* interface' menu with the tag "Card" haven´t the same access' result of main menu – considering the 4 couples that reached this interface, only two couples visualized and clicked on this menu.

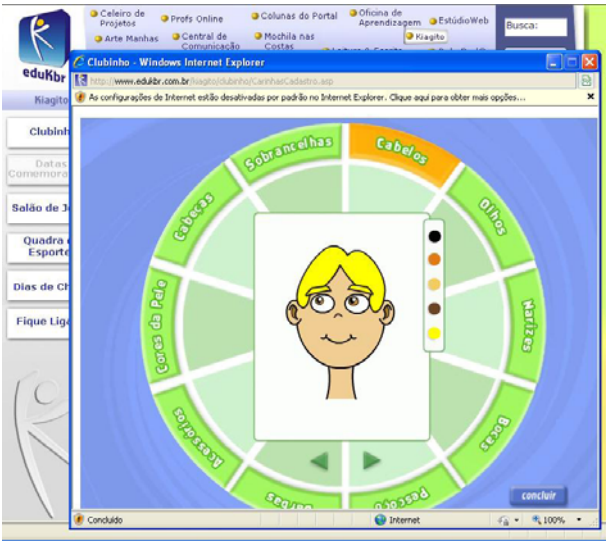

Fig. 2. Kiagito interface to create the portraits illustration for "*Clubinho* card"

Fig. 3. The "*Clubinho* card" at the *Kiagito* website

4 Conclusion

The initial question of this research was the adequacy of navigational systems of websites designed for children, with educational intention, to its users. The main focus when examining these interfaces was the design of *clickable areas* that must signalize navigation options and the interaction with user in hypermedia systems. The interaction between user and interface can be enhanced when the system model is similar to the users´ mental model.

In an educational website reach the learning process objectives depends on the encouragement given to the user to think and be critical to his actions inside the system. To this, child must be stimulated and feel safe to navigate in the website until she/he can find the desired information. Inversely, she/he can soon lose the interest in the system. In other words, the child needs to know what she/he is doing, feeling pleasure and curiosity to reach the desired information.

Clickable areas can stimulate users (in this case, children) in learning process, in retrieving information and problems solution, and from this, can guarantee satisfaction and motivation while using an interface. These graphic representations (the *clickable areas*) are subject to interpretation considering a cognitive process, which significance will be directly affect user´s behavior. So, the efficacy of *clickable areas* in navigation, considering an interactive system, depends on its graphic representations, that means, its design.

From the results, it was noticed that children's participation was essential to identify some usage aspects that probably could be unthinkable by adults during system development.

In many situations, during navigation, it was noted that the clickable areas design wasn't corresponding with children's mental models. From data analysis was possible to understand that is very important for children the doubtless to know "where" they are inside the system and "what" they should do to achieve their goal. When the navigation' conditions wasn't clear in this way, the children were disoriented and asked for help. Therefore, the Co-discovery method application pointed out some mismatches between users' mental models and the usability model of *Kiagito* website.

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