Children's Information Retrieval: how to support children in effective information-seeking?

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ABSTRACT

In this paper, we describe the objectives of our research project in which we aim to design a search interface in ways consistent with children's needs, cognitive development and thinking style to support children in effective information-seeking.

Categories and Subject Descriptors

D.3.3 [**Information Storage and Retrieval**]: Information Search and Retrieval – *query formulation, retrieval models, search process.*

General Terms

Design, Experimentation, Human Factors.

Keywords

Children, search behaviour, search interfaces.

1. INTRODUCTION

Digital media play an important role in young people's lives. Every day, more children have access to the internet. Even young children already use the internet for playing games or learning. Children seem to manage quite well in working with digital media and searching for information on the internet. But do they really find relevant information as easily as we might think? Do search interfaces support children in effective information-seeking?

2. CHILDREN'S INFORMATION RETRIEVAL PARADIGM

The domain of children's information retrieval (IR) is not limited to searching or browsing on search interfaces. Besides searching for information on an interface, the following components of the search process are also important. The child (1) must have some kind of information need, (2) has to conceptualize this need in his mind, (3) has to translate this need in a question (a search query) and finally, (4) the child has to present this query to an information system. After that, an information retrieval system (5) has to process this query, (6) has to match this query with the information world and (7) has to score, rank and present relevant

results. Finally, (8) the child has to understand these results and select a relevant result to satisfy his information need.

In general, these components of the IR paradigm are the same as for adults, but can we really use the same paradigm for children and for adults? Or are there differences between children's and adults' information-seeking behaviour? If that is the case, we need to work towards filling in an IR paradigm especially for children. We need to know what children think and what choices they make in the process from information need to query formulation. Only in that way we can effectively support this process for children. In this section, we describe what previous research already taught us about children's information-seeking. Is there a difference in the process from information need to query formulation between children and adults and what are these differences then?

2.1 Children's search behaviour

In searching on the web, the two most important search strategies are searching and browsing. Keyword searching relies on recall; and browsing relies on recognition. A general assumption is made by researchers that browsing-oriented search tools are better suited to the abilities and skills of children than are keyword search tools (Borgman et al., 1995), because recognition imposes less cognitive load than recall. However, the difference in performance on these different search tools depends on all kind of factors such as the level of abstraction of offered terms (concrete vs. abstract), the kind of search task (open vs. closed), or the extent in which the search tool supports the child in formulating a query. That is why research on searching versus browsing shows different results (Borgman et al., 1995; Hutchinson et al., 2006; Druin, 2003; Bilal, 2000; Schacter et al., 1998).

Research on the differences between children's and adults search strategies (Bilal and Kirby, 2002), showed that children were more chaotic in their search performance than adults. They made more web moves, looped searches and hyperlinks more often, backtracked more often and deviated more often from their target. The researchers concluded that adults adopt a linear or systematic browsing style whereas most children had a chaotic 'loopy' style.

2.2 Information-seeking problems

Most problems with children's information-seeking are due to the fact that search interfaces are designed by adults and based on adult's experiences and preferences. This causes problems for children, because they have other needs and preferences than adults and their cognitive, social, physical and emotional development has not yet reached the adolescent formal operational stage of development (Piaget and Inhelder, 1969, in Cooper, 2005). First of all, this causes problems concerning motor skills, because children have difficulties using a mouse. Also

typing is difficult for them and takes much time, because they constantly have to search for the right key.

Formulating a search query is also difficult for children, because they have less knowledge to base recall on than adults (Borgman, et al., 1995; Hutchinson, 2006). They tend to use natural language, that makes deciding on a single keyword difficult. For keyword searching, correct spelling, spacing and punctuation is needed, but that is also difficult for children. Category search (termed browsing) can also be difficult for children, because they have little domain-knowledge to decide which category is most relevant to their query. Also abstract, top-level headings can cause trouble, because children's vocabulary knowledge is mostly limited to simple, concrete terms (Hutchinson, 2006).

2.3 Results from research on AquaBrowser

We conducted a small experiment with both children and adults on the usability of a particular search interface, called the AquaBrowser, with a word cloud as a term suggestion tool to support children in reformulating their query. In general, we found the same results on children's and adults' search behaviour as in previous research. Most important new finding is that the term suggestion tool did not support children in effective information-seeking, because most suggested terms were to general for the specific queries. Another problem was that the children were distracted by the word cloud. The word cloud was only effective with very open, self imposed search tasks, in which children were open to other related term suggestions.

3. FUTURE RESEARCH

Existing research on children's information-seeking mostly report on navigation style, web moves, search strategies, search performance or search problems. The methods used in these researches such as recording browser activities (Hutchinson, 2006), online monitoring (Borgman, 1995; Druin, 2003), or observation of search sessions, are suitable to test whether particular search interfaces do or do not support children in effective information-seeking. Existing research, as reported in the previous section, showed that there are important differences between children's and adults' search behaviour. That is why we state the urgency of working towards an IR paradigm especially for children. Only on the basis of a children´s IR paradigm can we conduct research on designing search interfaces that are suitable for children.

The process of filling in this paradigm will be rather complex, because we know now that there are differences between children and adults, but we do not know what principles these differences are caused by. Existing research does not provide information about what happens in a child's mind during the process from a particular need to a query.

We think we can provide insight in the fundamental principles underlying children's search behaviour and search strategies and fill in the components of a children´s IR paradigm, by examining the process from information need to query formulation more thoroughly. Therefore, we have formulated four main objectives that will be the focus of our research.

A. What decisions does a child take in formulating a query or deciding on a search strategy given a certain search task?

B. What influence does the kind of information need (search task) have on the process from information need to query formulation or to a search strategy?
C. What influence does the context (interface) in which a question is asked (given a certain search task) have on the query formulation or search strategy?
D. When is the process from information need to query formulation good (given a certain search task)?

4. CONCLUSIONS

Children have other needs, skills, search criteria and search strategies than adults. That is why children have difficulties with finding relevant information on search interfaces provided for them on the internet. To our knowledge, existing research still does not provide insight in the fundamental principles underlying children's search behaviour and search strategies. In our research, we will work towards filling in the components of a children's IR paradigm by examining children's process from information need to query formulation. By examining that process, we want to find out how to design search interfaces that are consistent to children's needs, skills and cognitive development to support them in effective information-seeking.

5. ACKNOWLEDGMENTS

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