How Children Search Online at Home

Allison Druin, Elizabeth Foss, Hilary Hutchinson[1], Evan Golub, Leshell Hatley
College of Information Studies/Dept. of Computer Science, University of Maryland/Google[1]
Contact: allisond@umiacs.umd.edu

Traditionally, researchers have portrayed information-seeking as systematic, orderly, and procedural. But as this child shows (Figure 1), seeking information using a keyword search interface on the Internet can lead to uncertainty and confusion, with a search process that can be repetitive, complex and at times end in frustration.

This is a child we have come to call a *Developing Searcher*. He has challenges with spelling, typing, query formulation and results interpretation. Over the last year, our work with 83 children, ages 7, 9, and 11, have shown that these young people demonstrate seven distinctive *search roles*, sometimes with multiple roles present during any given information-seeking experience. To define these roles we examined their behavioral patterns by age and gender with particular interest in what triggered searching and what the barriers were.

STUDY METHODS

Between September 2008 and July 2009, we undertook a qualitative study to better understand how children search for information on the Internet. We realized that both the interfaces that children use to search and the content returned are subject to change on a daily basis, making quantitative analysis a challenge. We did not want to circumvent this challenge by constraining children only to fixed tasks, interfaces, and results, as this would subvert our goal of observing their natural behavior. Consequently, we chose to collect data by letting children search freely and then moving into more targeted tasks. We then used a rigorous qualitative approach, to structure our analysis.

Participants

We worked with 83 children from the Washington DC metro area: 42 boys and 41 girls, 28 age seven, 29 age nine, and 26 age 11. The children and at least one of their parents were self-selected to participate in the study. All the participants in our study had computers and an Internet connection in their homes. All but 12 of the children used computers regularly both at home and school.

Data collection methods

We conducted qualitative, in-home interviews. Each session began with the researcher interviewing the parent, captured with audio recording. We then interviewed the child, taking notes and video recording the child's keyboard and screen actions. We did not mention any search engines or tools by name in the interviews until either the child mentioned them or had searched on their own several times. We began with open-ended questions to see what search tools children used, and how they approached searching for their own pleasure: "Can you show me and explain how you usually look for something on the computer?" From this, we moved to a more task-oriented set of questions: "How would you look for information on dolphins? How would you look for information on what dolphins eat?" Next, we asked a more personal but targeted question: "If you were searching on Google for your own interest, what would you look for?" Finally, we asked a complex, multi-step question with only one right answer: "Which day of the week will the vice president's birthday be on next year?"

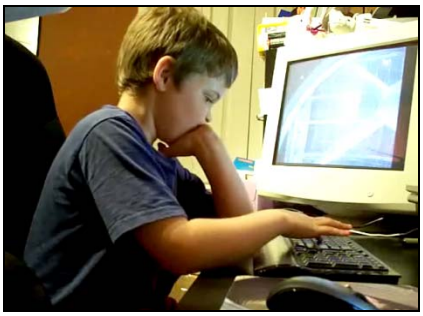

Figure 1 – A 7-year old child searching online

Data Analysis Methods

We used qualitative methods to understand the process and outcomes of the children's search experiences. We used the data coding research methods described by Strauss [1]. Specific categories for analysis were first developed using "open coding" methods of sorting, comparing, and categorizing data. We then used "axial coding" to further refine specific areas of the data. Using these techniques, we found that one useful way to consolidate the rich qualitative data to reveal the larger trends, strengths, and challenges of the search process was to describe the children as having *search roles.*

SEARCH ROLES DEFINED

Based on this data analysis process, seven search roles were ultimately defined. They are described below in order of how frequent these roles were found in the study, with the most frequent discussed first.

Developing Searcher

This role is the most common role children ages 7, 9, and 11 years old exhibit in this study. The defining behavior for the developing searcher is *willingness*, but not consistently successful, ability to search. *Developing Searchers* tend to search by using natural language syntax as opposed to keywords. Quite frequently they will by-pass a search engine and go directly to a website.

Domain-specific Searcher

Domain-specific Searchers are children who typically limit their searches to finding specific content of personal interest, which can include online games, sports scores, shopping, and videos. These searchers continually return to a small number of specific websites, and therefore, are limited in their knowledge of how to use a search engine to find new content. *Domain-specific Searchers* feel an ownership towards the content they search for and use.

Power Searcher

Power Searchers possess sophisticated searching skills. A defining characteristic of this group is their ability to understand and use keywords while searching. They are also reflective during the searching process, and can explain their searching strategies if asked. *Power Searchers* approach searching using tips or rules that are helpful to searching which they have learned from experience or from others.

Non-motivated Searcher

Unlike *Developing Searchers, Non-motivated Searchers* lack the *will* to search. *Non-motivated Searchers* are also not persistent when searching; they may attempt to find an answer briefly, and then give up or offer an alternative solution. They usually do not ask for help, admit their difficulty, or try something new.

Distracted Searcher

The role of *Distracted Searcher* is defined by children going off-task easily and wandering off on new search paths. They are difficult to get back on task, requiring multiple verbal prompts. Visual movement such as animation, blinking text, or videos within the searching interface or on linked websites is often distracting. In addition, the physical environment can also be a distraction for these searchers.

Visual Searcher

Visual Searchers are characterized by their desire to search within a visual context and have search results presented either as images or as videos. *Visual Searchers* do not simply click on an image or video result; they intentionally narrow their search results down in a visual format. These searchers frequently are able to effectively use search tools such as Google Images, YouTube, and Google Video.

Rule-bound Searcher

The least common, but clearly defined role for children in this study is that of the *Rule-bound Searcher*. As the name implies, these searchers seek information online according to an inflexible set of rules that they have learned through experience or other people, such as teachers or parents. These children are not able to adjust their rules to adapt to different types of searches. Yet, despite their frustration, they display persistence in their searching.

ANALYSIS USING SEARCH ROLES

We found in this study that most children exhibited multiple search roles. Most children in this study exhibited from 1 to 4 roles with an average of less than 2 roles per child. The 7-year olds exhibited the most roles per child, and the 11-year olds the fewest. This suggests that as these children get older; their search roles become more consistent.

Children had varying abilities to understand whether they had found what they were seeking, due to a wide variety of barriers. Not surprisingly, we also found very few children in this study were successful in formulating multi-step queries. We also found that among all of the search roles, children were more successful when they looked for information of personal interest, due to motivation, past experience, or both.

The girls at all ages in this study tended to offer their concerns when faced with challenges, while the males would suggest a way to fix the situation. For example, one 9-year old girl said, "Oh, oh, I'm looking for the wrong thing. I'm not good at math, I don't know." On the other hand, the boys would explain a new path forward. For example, a 9–year old boy suggested, "I could just get off the computer and look at a calendar." For a more complete understanding of this research see our full papers [1, 2].

ACKNOWLEDGEMENTS

We gratefully acknowledge the financial support of two Google Research Awards 2009 & 2010. We could not have accomplished this work without the parents and children who participated.

REFERENCES

1. Druin, A., Foss, E., Hutchinson, H., Golub, E., & Hatley, L. (2010). Children's roles using keyword search interfaces at home. In *Proceedings of ACM CHI2010*, Atlanta, Georgia.
2. Druin, A., Foss, E., Hatley, L., Golub, E., Guha, M. L., Fails, J., & Hutchinson, H. (2009). How children search the Internet with keyword interfaces. In *Proceedings of Interaction Design and Children (IDC 2009)*, Cuomo, Italy.