Tangible Information Interfaces for Children in Public Libraries

Karen Detken, Andreas Schrader

ISNM – International School of New Media
at the University of Lübeck
Willy-Brandt-Allee 31c
23554 Lübeck, Germany
k.detken@isnm.de
andreas.schrader@isnm.de

Abstract: The role of public libraries as facilitators of information has often been questioned against the use of rigid bibliographic structures and tools that appear to provide the expected functionality just in the hands of experts. Online Public Access Catalogs in children's libraries are supposed to assist young patrons in finding books on their own and explore available services. Although some OPACs have been modified in the presentation and structure of information to appeal to young users, they are still hardly used by children. This work in progress is currently investigating how an interface based on tangible interaction could support children better in their searching tasks within a public library.

1. Introduction

The way children look for books and information in physical libraries differs from that of adults in several aspects. Research in the area of children's information seeking behavior indicates that the young readers prefer to browse the shelves or ask the librarians before using computers to look for books [Bo95] [Er07]. Likewise, it has been shown, that children are more motivated to read when they are able to select reading materials on their own [Re04]. Nevertheless, interfaces to search for information are similar in all areas of public libraries, ignoring the particular searching preferences of the youngest visitors. Attempts to adapt online public access catalogs (OPACs) to children's needs and seeking behavior have emphasized changes in the presentation and structure of data, but the form of interaction has usually remained the same.

2. Related Work

Borgman et al. studied the use of the Science Library Catalog (SLC). They suggested that "keyword systems are faster once the keywords to search are known", but are problematic because they require users to have skills that are absent or at developmental stage in a young age, like "typing, correct spelling, vocabulary knowledge, alphabetizing, and Boolean logic" [Bo95]. They found that younger children prefer browsing interfaces, while older children with experience in keyword based systems prefer a direct path to the records [Bo95]. Reuter and Druin studied the use of the International Children's Digital Library (ICDL) with children of different ages [Re04]. The preference of younger children to select their books by "spinning" a world globe led them to conclude that they "seem to prefer a simpler, more interactive interface" [Re04]. Hutchinson, Bederson and Druin found that the simultaneous presentation of a flat category structure favors the creation of Boolean queries and browsing [Hu05]. Nevertheless, younger children did not understand the Boolean logic, thus they concluded that it should be possible for children to use the interfaces regardless of this understanding [Hu05]. They made Boolean searches visually clear and easy to create through point-and-click interaction [Hu05].

Research in the area of children's selection strategies for recreational material reveals that the title and covers are the most relevant factors in children's decisions. Young children tend to rely more on graphical cues and physical properties of the books, while older children care about genre and topic [Ru07].

Some of these findings have been taken into account in the development of prototypes for children's physical libraries. The StorySurfer, developed within the Children's Interactive Library project of the Interactive Spaces research center enables children to select categories by stepping on buttons, causing book covers to get reflected on the floor [Er07]. The children are invited to walk among the covers to select items of interest [Er07]. Their choices are "sent" to a tabletop interface where children can obtain information and print a sheet with the location in the library [Er07]. The interface allows multiple users, encouraging social interaction [Er07].

Efforts have also been conducted to improve patron's orientation in the physical library. An example is the "Room for Children" at the Kulturhuset in Stockholm, which has implemented a categorization system based on the way children ask for books [Jö06]. A visual sorting system identifies each shelf with an image and within the shelves, objects help the children to identify the books [Jö06]. The authors comment that "children are more than able to orient themselves in this system" [Jö06].

Visual layouts and maps have also been often implemented for these purposes. However, new technologies offer different possibilities to bridge the gap between the call numbers in a screen and a physical item in the library. Choi et al. [Ch06] and Satpathy and Mathew [Sa06] propose systems based on a combination of RFID technology to identify the users and objects, mobile devices to access the catalogs, and LEDs that light up at corresponding locations at the shelves to provide targeted visual feedback when patrons are searching the selected books [Ch06] [Sa06].

3. Proposal: tangible interaction in children's public libraries

The relevance of libraries in children's lives is not limited to school activities. Public libraries are important also as providers of social interaction and entertainment. An initial phase in this work has focused on the identification of information needs among the young patrons. Results based on interviews and observations conducted in two public libraries in Germany confirmed previous studies concluding that public libraries are mainly perceived as "leisure resources rather than 'scholarly' ones" [Re07]. Most of the reasons mentioned by children to be in the library were related to print and non-print media material and few participants were looking for something specific. Just two children mentioned to be searching material for schoolwork. The reasons given by children regarding their preference to browse the shelves instead of searching at the OPAC point to the fact that most of the times they already know where to find what they want, or that they are not looking for particular titles.

According to Piaget's Theory of Intellectual Development, children start to understand the world by acting and sensing [Co05]. Even when they acquire their first reading capabilities, young children keep relying on visual and spatial cues to gather information [Co05]. Children younger than 11 years of age have not yet acquired the capability to fully understand abstract concepts like Boolean logic or categories found in library catalogs [Co05]. They rely more on recognition rather than recall, and do not have much experience with keyboards and mice [Co05] [Hu05]. It has been found that a slower processing of information in children affects their motor skills [Hu05]. Following principles defined by the Fitt's Law and studies about drag-and-drop interaction, interfaces for children have been designed with big icons, and work mostly with point-and-click interaction [Hu05].

Tangible interfaces take advantage of the natural ways we deal with objects in the world, and enable individuals to apply skills learned long before intellectual ones [Is01]. In the case of children, this makes more sense, because most of their experience in the world is based on interaction with objects existing outside of a screen. Moreover, by not being constrained to the input of a mouse and a keyboard, tangible interfaces are more likely to encourage social interaction, which is an important aspect in a public library. When dealing with abstract classification systems and complex hierarchical structures, tangible interfaces might support children's understanding of these forms of organization by providing more concrete ways of representation. A tangible interface might allow children to manipulate the structure with their own hands, rendering also their movements meaningful and thus providing the child with extra and implicit information to accomplish the task. In contrast, a GUI is limited by a point-and-click interaction that adds no meaning or information about the task, and all it can do is rely on visual cues to orientate the child.

3.1. First ideas for a tangible information system

The few cases of specific and imposed search tasks in a public library indicate that information interfaces should emphasize functionalities that allow visitors to discover more about what is available according to their preferences.

A first proposal has been called the "Searchwall", which would allow more than one person to use it, supporting social interaction. It contemplates the use of RFID enabled ID objects to identify the child's age and display results in a corresponding order. Hanging a small key-holder resembling a basket at a certain spot of the interface would be enough to start the "searching session" (see figure 1 – 1). Nevertheless, the users would be able to search without using any object as well.

The interface would provide three different types of navigation: between shelves or categories (turning a rotation sensor), within shelves (rotation sensor) or results inside the categories, and "inside" items (pressure sensor) (figure 1 – 2,3,4). The last form of navigation mentioned would enable children to receive more information depending on how much they press the button. At the release of the pressure sensor, the cover of the material would appear again. In this way, the visitors will receive enough information to make their decisions, but will not be overwhelmed by it from the beginning.

When first approaching the interface, it would show selected contents of the shelves in the physical library. Each palette would represent a shelf (5). The shelves in the library would be identified with the picture of a character or "shelf custodian", and the image of this character would also appear above the palette (6). This is aimed at supporting the child's orientation in the library, while making it easier to inspect the books of the places children usually access. The characters would also be available physically at the interface. By placing a character with an embedded RFID tag on a specific spot of a small table near the interface (7), the contents of the corresponding shelf would appear. In this case, the characters showing at the top of each palette would disappear, and the palettes would now represent a category existing at that shelf. The child would be able to select a maximum of six books my moving the sliders downwards (8).

It would be possible to narrow the amount of results by inserting cards or tokens representing predefined categories with appropriate illustrations and text in small bags representing question words (9). In addition, the children could also select the physical properties of the materials they would like to have by rotating dials (10). Changing the physical properties of an item is a less abstract concept, while the selection of categories needs to provide children with a mechanism that allows them to see easily what is available, so they can recognize their interests among the options.

The search session would end at any moment just by taking the basket away. A text in the message area (11) would indicate the child to pick print outs with the information about the location of the selected items (12). An image of the "shelf custodian", plus the corresponding section in the shelf, number and cover of the book is suggested. However this might vary depending on the size of the library.

Further support could be found in the shelves. By placing the basket "loaded" with the selected books on a surface near the picture of the "shelf-custodian", an auditory output would support the child if the book has not been found. An additional implementation of a guiding system with LEDs will also be investigated. RFID readers, sliders, rotation and pressure sensors would be installed behind the wall. The visual elements would be projected form behind just to certain areas using a translucent material. The areas with the sensors would be covered with polystyrene or similar material.
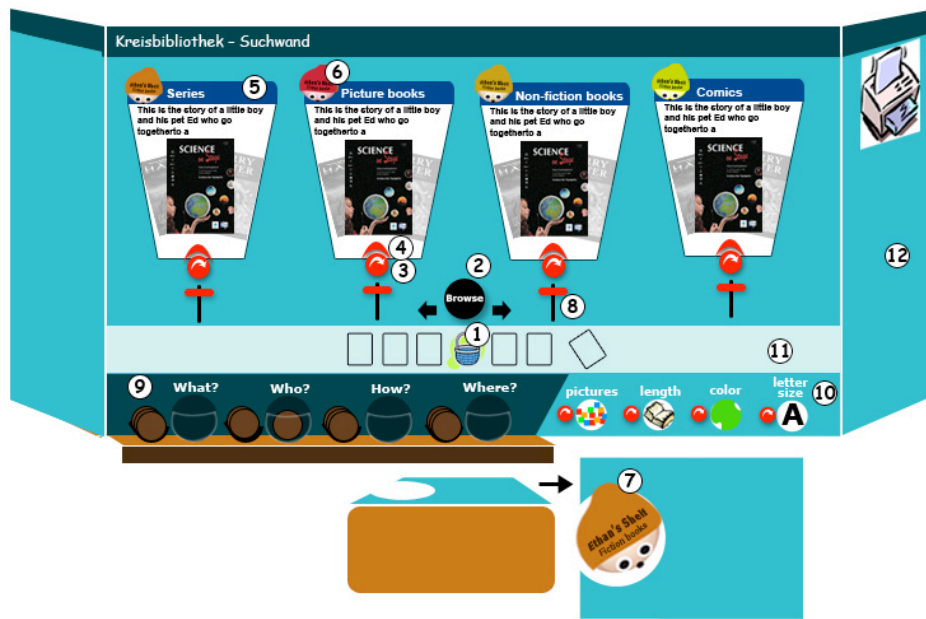

Figure 1: Preliminary concept for a tangible information interface.

4. Conclusions and future work

Catalogs work mostly when the title or information about the material is known in advance. This is very useful in research and school libraries where children are given a certain topic to find information about. However, in a public library, where users are driven mainly by their personal likes and preferences, searching strategies are different. As in a big store, children usually go to the shelves containing their favorite material.

The project is currently in a user's analysis stage, where important guidelines like children's information needs in the public library have been identified. Further analysis will reveal the preferences of the users more accurately to refine the characteristics of the system. The presented ideas need to be further supported by technical analysis in order to suggest implementations and identify challenges. A categorization for the library material based on previous child-friendly systems needs to be created and the visualization of results and functionalities has to be defined.

5. Acknowledgements

References

[Bo95]   Borgman, C.L., Hirsh, S.G., and Walter V.A.: Children's Searching Behavior on Browsing and Keyword Online Catalogs: The Science Library Catalog Project. In: Journal of the American Society for Information Science 46, no. 9: 663–684.

[Er07]   Eriksson, E., Lykke-Olesen, A. and Krogh, P. G.: Inquiry into Libraries - a Design Approach to Children's Interactive Library. In: Proceedings of the Nordes 2007 Conference on Design Inquiries. Stockholm, Sweden, May 27-30, 2007

[Re04]   Reuter, K., Druin, A.: Bringing together children and books: an initial descriptive study of children's book searching and selection behaviour in a digital library. In: Proceedings of the 67th Annual Meeting of the American Society for Information science and Technology, 339--348.

[Hu05]   Hutchinson, H.B., Bederson, B.B., Druin, A.: Interface Design for Children's Searching and Browsing. Human-Computer Interaction Lab. University of Maryland. Available at [http://hcil.cs.umd.edu/trs/2005-24/2005-24.pdf]

[Re07]   Reuter, K.: Assessing aesthetic relevance: Children's book selection in a digital library. In: Journal of the American Society for Information Science and Technology, 58(12):1745–1763, 2007.

[Er07]   Eriksson, E. and Lykke-Olesen, A.: StorySurfer - A Playful Book Browsing Installation for Children's Libraries. In: Proceedings of the Conference on interaction Design and Children, Aalborg, Denmark, June 06 - 08, 2007.

[Jö06]   Jörgensen, J.: A children's library or a library for children? In: Holmgaard, J. (ed.): Nordic Public Libraries in the knowledge society, Danish National Library Authority, 2006.

[Ch06]   Choi J., Oh D., Song I.: R-LIM: an Affordable Library Search System Based on RFID. In: International Conference on Hybrid Information Technology (ICHIT'06). IEEE, 2006.

[Sa06]   Satpathy, L., Mathew A.P.: RFID assistance system for faster book search in public libraries. In: Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI '06). Montreal, Quebec, April 22-27, 2006.

[Si07]   Silverstein, J: Digital Reference Services: Recommendations for Supporting Children's Informal Learning. In: Chelton, M.K. and Cool, C. (eds.): Youth Information-Seeking Behavior II. Context Theories Models and Issues. pp. 257 – 277. USA: The Scarecrow Press, Inc, 2007.

[Co05]   Cooper, L.: Developmentally appropriate digital environments for young children. In: Library Trends 54 (2), pp. 286-302, Fall 2005.

[Hu05]   Hutchinson, H., Druin, A., Bederson, B.B., Reuter, K., Rose, A., Weeks, A.C.: How do I find blue books about dogs? The errors and frustrations of young digital library users. In: Proceedings of HCII, Las Vegas, NV (CD-ROM), 2005.

[Is01]   Hiroshi, I: Tangible bits : Designing seamless interface between digital and physical. In: ICSID SEOUL Proceedings, pp. 15-22, 2001.