

Methodological aspects concerning digital libraries for children

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Abstract

Digital libraries are nowadays offering a huge quantity of resources in different formats, for a wide spectrum of users. Making some of these resources available to children poses a number of specific challenges, especially when it comes to designing the user interface and to modelling the user interaction. This paper is part of my Ph.D. thesis and describes research aspects concerning digital library interfaces for children between 7 and 12 years old. The adopted methodology involves using the creative input from a number of children, in order to improve the specificity of the application. Children were considered design partners. The results were analysed in terms of user experience and accessibility.

1 Digital libraries for children

1.1 What is a digital library?

According to [1], a digital library can be defined as: "A potentially virtual organisation, that comprehensively collects, manages and preserves for the long depth of time rich digital content, and offers to its targeted user communities specialised functionality on that content, of defined quality and according to comprehensive codified policies."

In the Romanian scientific literature, the digital library is furthermore defined as: "a library with a similar content to one of written publications, but in which the documents have been digitally stored and can be accessed remotely" [8].

The virtual library is defined as:

- a library whose resources reside in electronic documents
- a medium that is structured by multimedia materials in such a way, as to enable rapid and informed access to the resources.
- a generic term designating all libraries on electronic media [8]

1.2 Actual studies on Digital libraries for children

The majority of today's digital libraries were never aimed towards young children. These children would commonly need to build complex text keyword searches were they to access these libraries. Few libraries offer visual tools for browsing the information in addition to querying, so as for young children to be able to explore them intuitively. Children also organize and present the information that they have found differently from adults. [2].

Recent research in technology for children has mostly focused on the resultant technology instead of the children involved in the design process. Within HCI there is some research exploring design processes. However, these works mostly avoid focusing on the impact that the process has on its participants, and rather dwell on the process itself. A few of the papers that report on the process used to design technology informally report benefits to children involved as design partners to technology design processes, such as [3],[4],[5],[6]. The discussion upon the impact that children have if involved in the design process tends to be secondary in these papers to the discussion of the design methods or process itself.

We find an interesting study in [7]. This study describes the children's interest in books, libraries, technology and the world around them by conducting interviews, alongside with collecting drawings and book reviews. The findings from this study includes the increased amount of books that these young people read online; the value they still place in the physical libraries as spaces for social interaction and reading; the increased reading motivation, as well as an increased interest in exploring different cultures.

2 Initial case study

In 2009 we commenced our work on a case study on children aged 7 to 12, by utilising a number of questionnaires and software products to test the preferences of students towards user interfaces. The study was performed on a population of 395 children from the county of Sibiu. The age, gender and the living environment breakdown is shown below:

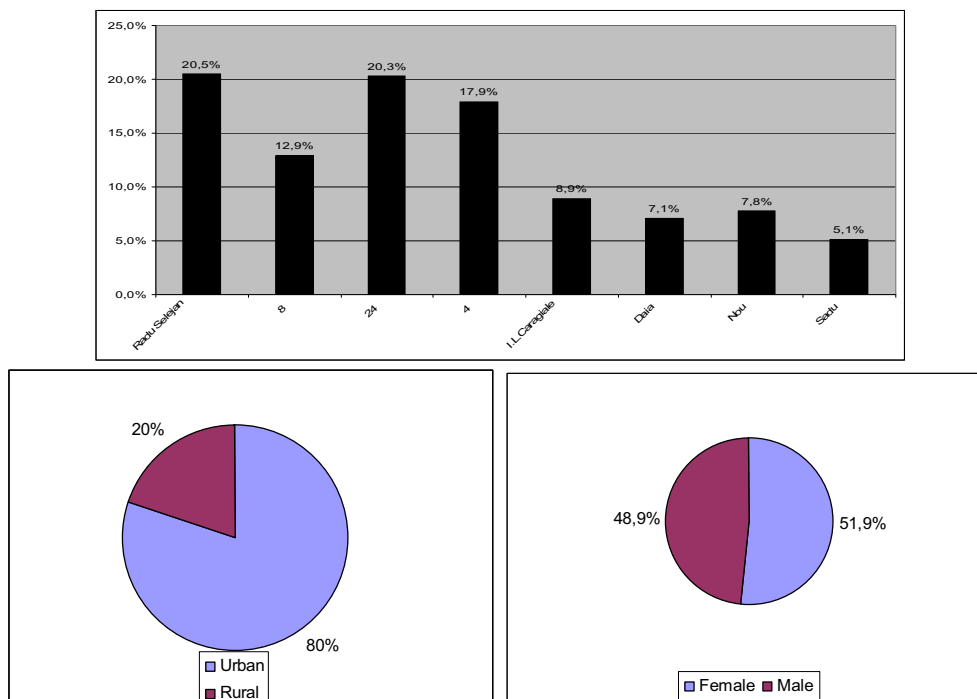


Fig. 1: Age, gender and living environment breakdown

Furthermore, we found that there is a high level of interest in using computers and working with them.

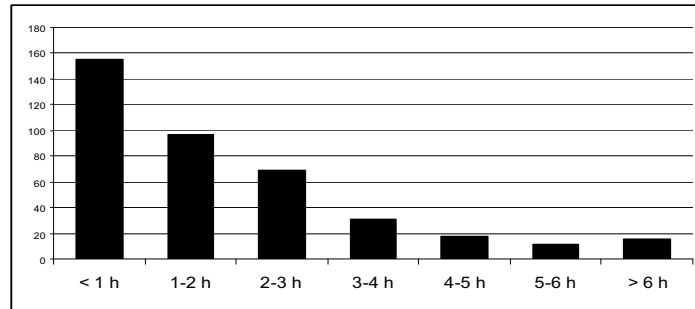


Fig. 2: Time spent working with computers (weekdays)

3 A digital library as a 3D interactive world

One of the used applications underwent a number of transformations, as the children provided their input to it. The application seeks to determine whether the use of a digital library leads to an increased reading appetite (both physical and digital media). We will further describe the phases we went through.

3.1 Application architecture

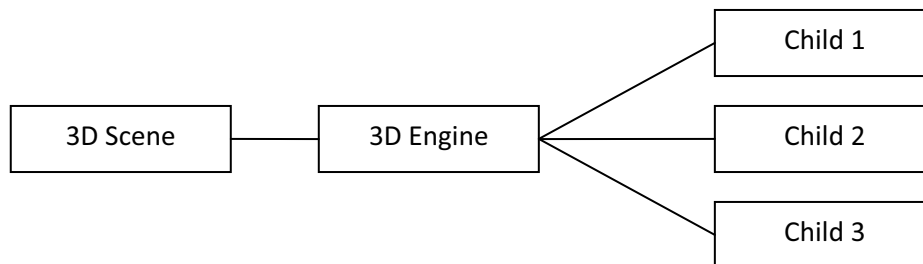


Fig. 3: Initial application architecture

The 3D scene can be built in any 3D editing software and must be saved as an .x file. Our study started with a 3D model of the library of the “Lucian Blaga” University of Sibiu.

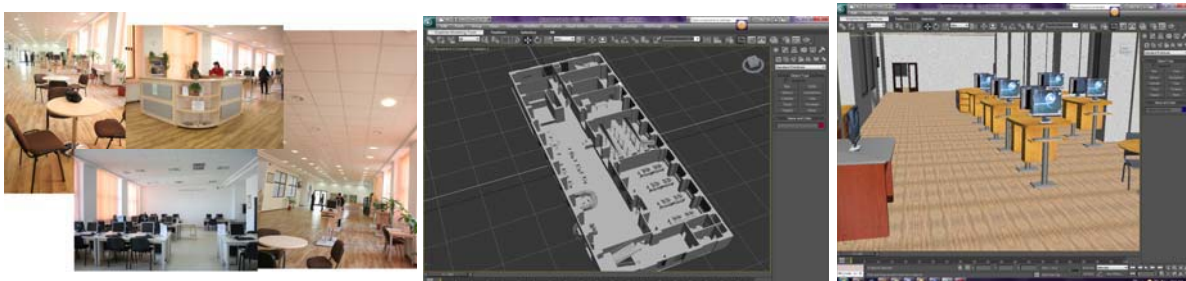


Fig. 4: Building the 3D scene

Our initial data was the 2D plan of the building, as well as pictures of the library. The first step was the modelling of the rooms on all the floors of the building, based on the 2D plans. The next step was to insert a number of different objects in the scene, like bookshelves, tables and

computers. The final touch was setting the right textures and lightings. In this initial phase the children were not involved in any way. The result was an .x file with a simplified model of the library.

The 3D engine was written in C# and uses the Microsoft XNA library. The initial version of the 3D engine allowed us to:

- load and display a scene saved as a .x file
- rotate the viewpoint
- move through the scene
- define points of interest

3.2 Methodology

We decided to involve the children on different stages of the design and implementation.

The first stage involved 12 children of aged 8 to 9. We let the children to explore the 3D Library, using the same test computer and without any supplementary information. From the very beginning, all of them figured out by themselves how to navigate through the virtual world. There were some interesting results after a mere 10 minutes of testing the virtual world:

- All the children who tested the application were delighted by it and requested a copy of it for home.
- 7 children did not open the books integrated in the environment and preferred only to explore the 3D space.
- All of them entered the virtual toilet.

After several testing sessions, the application was improved step by step:

- it now offers a greater interactivity
- in the 3D environment there is currently a single book, which is split into individual pages. The children receive information as to where to find the next page.

The architecture of the application has become:

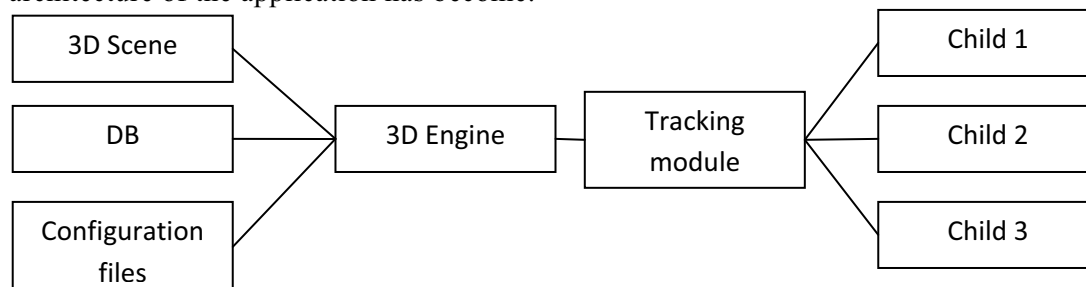


Fig. 5: The final application architecture

A tracking module was introduced in order to retain extra user data, as for example the keyboard use and the time required to complete a certain imposed task.

3.3 Results

The evaluation was performed using

- a) cognitive evaluation: the children receive the task of going through a document and answering questions regarding what they read
- b) pluralist evaluation (directed evaluation)

While working with the children, the application underwent a number of changes. We will mention a few of these:

- The interface was modified 4 times between evaluation rounds
- The interactivity had to be improved
- We came up with the idea of a scenario - a number of steps that have to be performed in order to discover all the pages of a book
- The idea of a reward at the end appeared

There are a few requests from the children that still have to be implemented:

- audio support for books
- information on how many of their colleagues have read the book (a social aspect)

Conclusions

The designing of an interface for a digital library for children must be done in accordance with the children's needs and with the influence of the educational environment in mind.

The children can be easily involved in designing and using novel applications, as responsibility creates motivation. The next logical step is to develop specialised collaborative tools to help children use and develop interfaces for digital libraries.

Further studies regarding the decisional behaviour of children aged 7 to 12 must be performed in order to establish an optimal pattern of working with and for them.

References

- [1] L. Candela, G. Athanasopoulos, D. Castelli, K. El Raheb, P. Innocenti, Y. Ioannidis, A. Katifori, A. Nika, G. Vullo, S. Ross: *The Digital Library Reference Model*. April 2011, 17
- [2] <http://www.cs.umd.edu/hcil/kiddesign/searchkids.shtml>
- [3] Druin, A. *What children can teach us: Developing digital libraries for children with children*. Library Quarterly, 75 (1), 2005, 20-41.
- [4] Farber, A., Druin, A., Chipman, G., Julian, D. and Somashekhar, S. *How young can our design partners be?* Participatory Design Conference, CSPR, Malmo, Sweden, 2002.
- [5] Hourcade, J.P., Beitler, D., Cormenzana, F. and Flores, P. *Early OLPC Experiences in a Rural Uruguayan School*. Proceedings of Computer Human Interaction 2008: Art, Science, Balance. 2503-2511
- [6] McElligott, J. and van Leeuwen, L. *Designing sound toys for blind and visually impaired children*. Proceedings of Interaction Design and Children 2004: Building a Community. 65 – 72
- [7] Allison Druin, Ann Weeks, Sheri Massey, Benjamin B. Bederson, *Children's Interests and Concerns When Using the International Children's Digital Library: A Four-Country Case Study*, JCDL '07 Proceedings of the 7th ACM/IEEE-CS joint conference on Digital libraries
- [8] Mircea Regneala, *Dictionar explicativ de biblioteconomie si de stiinta informarii*, vol. 1, Ed. a 2-a rev. București : FABR, 2001

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