Testing the OLPC Drawing Activity: an usability report

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Abstract

Recently, low cost mobile platforms specially developed for basic education have appeared on the market. The OLPC (One Laptop Per Child) XO laptop, the Intel Classmate and the Encore Mobilis are examples of these new equipments. In the near future, these platforms could be distributed to public schools, enabling mobile learning and one-to-one computing environments in emerging school communities.

Mobile Learning focuses on learning across spaces, across contexts and learning with mobile devices. We have developed the Oficina software; a drawing activity developed to run on XOs educational laptops and is part of the XO distribution.

We believe that usability tests are an essential step in the development of a software application and we have conducted such tests for the Oficina software. The work presents the description and some conclusions of the test we applied to children between 12 to 16 years old to verify easiness of its use.

1. Introduction

In the last two years a low-cost laptops have appeared as a new resource to help the improvement of the education. One of those laptops is known as XO that is been developed by One Laptop per Child (OLPC) Foundation. The one laptop per child project is an Education project, not a laptop project [1].

Low-cost mobile devices in Education (like OLPC's XO) brings a different concept of education: Mobile Learning, which is "any service or facility that supplies a learner with general electronic information and educational content that aids in the acquisition of knowledge regardless of location and time" [2]. Especially in developing countries, those platforms are introducing the "anytime and anywhere" paradigm. Gained mobile benefits are expected to improve learning results, as well as being a means for students "learn learning" [2] [3].

In this context, the Brazilian Government created a project named UCA (Um Computador por Aluno – One Computer per Student). In 2007 preliminary tests were conducted in five schools to evaluate the different available platforms. After the choice of one of these platforms, 300 schools will receive this kind of platform. The UCA project aims to distribute a mobile computer for all public school students, "as a form of improving education quality and reducing of the digital divide" [4] and to provide users' social and digital inclusion [5]. Included students are those from 1st to 9th grade, which is considered the Basic Education Cycle. Normally children are between 6 to 15 years old while frequenting it.

This paper presents a usability test that was conducted on the Oficina, a new computer authoring tool and also open-source software distributed with the OLPC base system.

2. Oficina Description

The Oficina software enables users to represent the world in a way most drawing tools do not. The main difference between it and the conventional software features is its uncommon shapes and its free-form polygon, augmenting creation possibilities [6].

There are another available open-source software like GIMP and Inkscape that have many drawing features, as filtering in GIMP and the vectorial images in Inkscape. Requirement analysis revealed that it would be necessary 43MB to install GIMP and 47MB to install Inkscape while Oficina requires less than 500kB for its installation. Hence, regular software library dependencies discourage installation, when the goal is to use only 200MB for the whole operating system. These numbers consider XO's system conditions, which has a GTK 2 based interface [7].

The Oficina also shows a new approach in the user interface as the Sugar, the graphical interface of OLPC's XOs. It aims to be simple and intuitive and there is no matter how much computer experience the user has.

3. Interface Concepts

The OLPC team attempted to build from scratch a graphical user interface (GUI) tailored to children's specific needs in learning. Sugar is based on what is called the “Zoom Metaphor” (in opposition to the “Desktop” one), which relates four discrete views in the mesh network: Home, Groups, Neighborhood and Activity. This new metaphor reflects one of the core ideas of the project, the focus on collaboration. When in the appropriate zoom level, children can see whoever shares their network, being able to work with and help one another.

Expression is another key idea. Most of the XO's activities focus on the creation of some type of object (an image, a text, etc.). The presence of activities instead of applications in the laptop is a core concept. This is more than a naming convention; it is an educational paradigm, as “activities are distinct from applications in their foci — collaboration and expression — and their implementation — journaling and iteration” [8].

4. Usability Tests

Usability tests are very important for software development. Some usability engineers believe that usability increases development costs [9], but users do not tolerate difficult designs or slow systems, and they do not want to learn how to use them [10].

It is a very hard task to design for children of all ages [11]. Children may take part in the software development process in four different ways: as technology users, as testers, as informants and as project colleagues [12]. It is also very important to involve some children of the target age group to verify the computer program adequacy for this kind of users [13]. For that, children (in the role of testers) use the prototypes during the software development process, helping the developers to address the reported technical and pedagogical issues.

5. Usability Test Description

A usability test was done with 6 kids and it took 1 hour. They were working alone in each OLPC XO and 4 observers tracked this group. The observers timed how long the activities took, wrote down additional information about the way children interacted with the interface and helped kids in some key tasks of the test where kids were unable to perform by themselves.

5.1. Criteria and organization

Usability goals were divided in two different groups, depending on what assesses it.

USABILITY INSPECTION

- Consistency among texts and images;
- Consistency among tool using (tools should work the same way no matter which tool was selected before);
- Legibility on a 7.5-inch screen;
- Good performance.

FIELD STUDY

- Intuitive icons and tool names;
- Creativity stimulation;
- Easiness of learning;
- Good performance.

Software performance (in the sense of time response) is an important issue for both groups.

Each kid received a printed list of activities to complete the task. The test was conducted as follows:

1. Presentation of the team and the children: so everybody felt comfortable during the test;
2. Explanation that the goal was to test the software and not the children, to avoid pressure and frustration;
3. Explanation what is the software that it will be tested for the children;
4. Pro-test Questionnaire application;
5. Usability test application;
6. Post-test Questionnaire application.

6. Test results and discussion

6.1 Field test analysis

The first questionnaire and observers' notes revealed testers' profile. They are students from 6th to 8th grade and are between 12 to 16 years old. They draw often using common materials like paper and pencil, probably due to Arts classes. They also use to browse in the Internet while using the computer, probably for communication purposes, as their later comments during the test seemed to show.

First questionnaire analysis has shown they associate the computer with entertainment. Half of the testers answered multiples uses (mainly entertainment and studies) on computers even though this possibility has not been emphasized during questionnaire application.

The post-test questionnaire revealed kids liked software appearance even being used to the Desktop paradigm. Tool icons and names are intuitive, the associated function looked clear. Observers reported kids performed better when a task was repeated, showing tools were easily learned. It was not possible to assess how good the software is to stimulate creativity; this issue could not be addressed in a short time and with a small group. Observers’ notes also pointed to some usability problems:

- Touch pad handling was not intuitive;
- Color selection dialog is not intuitive;

- Tab navigation did not bring light to tool grouping;
- Kids did not see (at the first look) the difference between fill and line color icons in Shape Tab;
- The current Portuguese translation for "fill" is not appropriated for children vocabulary.

Observers reported some situations where kids could not readily find a specific tool or took some time to remember where was a previously used one. A hypothesis is that tab organization was an unclear idea: it should be evident that each tab groups similar tools. Maybe tab names should change or have an associated image to represent the whole group.

6.2 Inspection analysis

In this analysis it was possible to detect some problematic points for users:

1. There are two tools with the same name but different functions: free-form polygon and polygon;
2. The word "tools" translated for Portuguese is very long and does not fit in the tab;
3. The fill color of all tools is chosen in the toolbox, only in the free-form tool the fill color is chosen inside the tool menu;
4. Some tools do not have an associated image pointer;
5. There is not enough space in the toolbox for all tools in the Shapes Tab;
6. Nothing indicates which tool is selected;
7. There are scroll bars in the drawing area;
8. The Undo tool does not work after the free-form polygon use;
9. All the words in the Activity Tab are not translated.

We hope this report helps to improve Oficina's interface as long as its usability.

7. Future Work

Further testing is needed to assess creativity stimulation, and for that a new list of activities should be made. With a script in hands, kids tend to strictly follow it, which is not desired to stimulate creativity.

8. Conclusions

The interface of educational software must be simple, intuitive and interactive, providing learning while playing environments. Involving children in the design process and in usability tests may be the key to success and certainly guaranties the development of more adequate interfaces.

The usability test helped us identify some interface problems that will be corrected in the new version of the Oficina. Usability tests are essential steps in any system development, especially when working with children, since the result of these tests can guide the development so that the system will be adapted to the users. An important aspect when usability tests are conducted with children is that they must feel comfortable and enjoy themselves, because their reactions are indications about the software interface usability.

10. References

[1] One Laptop per Child. Mission. URL: http://www.laptop.org/vision/mission/. Accessed on: Jan 21th, 2008.

[2] F Lehner, H Nosekabel. "The role of mobile devices in e-learning - first experiences with a wireless e-learning environment". *Proceedings IEEE International Workshop on Wireless and Mobile Technologies in Education*, IEEE Computer Society, Washington, USA, 2002, pp 103–106.

[3] One Laptop per Child. Mission. URL: http://www.laptop.org/vision/mission/. Accessed on: Nov 14th, 2007.

[4] J Franco et al. "Using Information Visualization in the Logic of Building an Interactive Knowledge Based Learning Network for Social Development". *Congress of Logic Applied to Technology*, Santos, Brazil, 2007.

[5] Ficheman, I. K. Aprendizagem colaborativa a distância apoiada por meios eletrônicos interativos: um estudo de caso em educação musical. Master's thesis, Universidade de São Paulo. 2002.

[6] A A G Martinazzo et al. "Interdisciplinary Learning using Low Cost Mobile Platforms: a proposal in Geometry and Arts". To Be Published: *M-Learning - Mobile Learning, IADIS Conference*. Algarve, Portugal.

[7] One Laptop per Child. Software Components. URL: http://wiki.laptop.org/go/Software_components. Accessed on: November 15th, 2007.

[8] One Laptop per Child. Principles. URL:. http://www.laptop.org/laptop/interface/principles.shtml. Accessed on: January 22th, 2008.

[9] Mayhew, D. J. *The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design*. Morgan Kaufmann. 1999.

[10] Nielsen, J. *Usability Engineering*. Morgan Kaufmann. 1994.

[11] Shneiderman, B. *Universal usability: Pushing human-computer interaction research to empower every citizen.* Tech. Rep. CS-TR-4043.1999.

[12] Druin, A., *The role of children in the design of new technology*. 2002.

[13] Druin, A *The Design of Children's Technology*. Morgan Kaufmann, 1999.