

The Accessible Web portal B-Navigator: Prototype Evaluation

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ABSTRACT

The accessible Web portal B-Navigator constitutes a digital medium between visually impaired and blind people, and Internet. This portal offers two basic functions: firstly, it “makes accessible” the Web page solicited by the user applying the accessibility norms recommended by international organizations; secondly, it “integrates” different adaptations like screen magnifiers, document readers, which are incorporated automatically in the Web page visited although they were not been provided in the original design.

This article presents an evaluation performed to a prototype of the B-Navigator portal, where twenty users with different visual disability levels have participated. It was mounted in the Braille Library of La Plata city, where an Internet environment was simulated.

The evaluation results were very useful. The users selection was adequately and lets us to test the performance, the assistance level, the efficiency of the human-computer interaction, the capacity of adaptation of the portal. In this manner, the quality of the product was analyzed.

This work was a great incentive to finish the portal development and to publish it definitively in the Web in order to be used by all of us without discriminations.

Keywords: Information adaptations, Accessibility norms, Web design, Web site evaluation, Visual and blindness problems.

1. INTRODUCTION

The “World Health Organization (WHO)”, globally estimates that an 85 millions persons are blind or visually handicapped [1]. Most of them have problems surfing the web, being excluded from this technological advance. The Internet is a new barrier that they must confront, and it represents a digital division very difficult to surpass [2].

From this restlessness, and with the purpose of approaching the impaired ones to the universe that Internet offers, the idea of developing a tool able to serve as a link between their computer and a web page was conceived.

This portal offers two basic functions [4]: firstly, it provides *the transformation or adaptation process* to make accessible the web page solicited from the user. It means to do automatically on the page the necessary modifications to make its design universal and to respect the accessibility rules. This is done considering the accessibility norms recommended and established by different organizations and consortiums such as “Web Accessibility Initiative (WAI)” of World Wide Web Consortium (W3C) [5], Microsoft Enable, “Equal Access to Software and Information (EASI)”, that among others, are dedicated to the problematic of handicapped people at Information Technology environment [6].

As a second functional element, the portal offers the *integration of different adaptations*, added automatically to the visited page, even though they weren’t originally provided. Adaptations such as voice synthesizer, screen enlarger, keyboard adjusting, document lector, developed with the aim of making easier the user-Web interaction. But, although the portal development

is well-intentioned and aspires to give a better quality of life to visually disabled people eliminating technological fences, the immediate success cannot be guaranteed. For that, it is necessary to make different studies and analyses first. [7]

This article presents the evaluation done with a prototypical portal version mounted on a simulated Internet environment, at the intranet of the Braille Library of La Plata city.

For the test, twenty users were carefully selected, including blinded and visually handicapped people with and without Internet and Information Technology knowledge. Characteristics like intellectual and physical skills required to the user to learn and understand the system, time used to do the activity series, subjective appreciation of the system by the users, and more over, were considered, in order to probe in which way the portal improved their interaction with the web.

2. GENERAL FEATURES OF B-NAVIGATOR PORTAL

B-Navigator portal provides two fundamental functions consisting on page “adapting” according to user’s visual capability and the “integration” of different types of computational adaptations in a natural and transparent way for the user [4]. Through the mechanism of automatic “adapting”, it is possible to adjust the properties of the web page visited applying the accessibility norms [5], and in agreement to the user needs. This tends to solve the topic of limited norms and lack of universality on actual web pages designs. The process of “integration”, tries to eliminate the complexity of adjustment of the computer through the installation of different auxiliary tools that exist in the market [3]. These two mechanisms are explained below.

Adaptation Mechanism: it consists on the transformation of web sites previously requested by the user, in its visual and structure properties, involving two important steps:

Normalization Process: it is the conversion of the page requested by the user to a page well-design, easy to be used and respecting the standard accessibility rules. It was based fundamentally, applying recommendations recompiled from W3C Consortium-WAI documents [5].

Personalization Process: it is the conversion of the normalized page to a page adjusted to the kind

of visual disabled detected, and to the kind of hardware and software the user has.

Integration Process: in this process adjustment elements and assistant services are added to the page code in order to make it more easier to use by handicapped persons. Three types of adaptations are included: voice synthesizer, screen or image enlarger and keyboard adjusting [4].

Voice Synthesizer: its objective is to simply the sending of information of the computer (in this case the web page content) to the user through spoken messages. Through the voice synthesizer, the portal reads to the user the text shown in any web page and more over provides an speaker assistant of web surfing. This assistant communicates every moment the different actions the user can do, informs the state of the navigation and the events that might happen on the web.

Screen Enlarger: it is made when the translation of the page is requested, where different properties of HTML tags of the original Web page are modified (specially tags <P>, <H>, <A>, , <DD>, <TD>, etc). Through this property’s manipulation, size, type and style of text could be modified, adjusting it to the user needs.

Keyboard Adjustment: it is shown as the solution to the most important of the problems that visual impaired users have to face at the moment they have to interact with peripheral devices. For that, based on accessibility norms related to the use of peripheral devices, some keys of easy access were defined for the visual handicapped person which provides an analogous function as the one obtained with the use of the mouse.

2. PORTAL EVALUATION

This inquiry was done with the active participation of users. Different traditional methods were used [8] such as interviews, informative conversations, debates, direct observation, which results were registered on forms designed specifically for this aim. Characteristics such as intellectual and physical skills, required for the user to learn and understand the system, time used to do the activity series, subjective appreciation of the system by the users were considered. Also, in which way the users felt the portal improved their interaction with the Web was analyzed.

This evaluation let us to test the portal in different aspects, like help assistance, interaction effectiveness, capability of adjustment and

personalization. The evaluation steps are explained in the following sections.

Sample of Users: A group of 20 participants was carefully selected, blind and visual impaired people were included with and without previous Computer Science and Internet knowledge. So that, the users were divided in four groups clearly differentiated:

- Group A: blinded people without Computer Science and Internet knowledge.
- Group B: blinded people with Computer Science and Internet experience.
- Group C: visually handicapped people without Computer Science and Internet knowledge.
- Group D: visually handicapped people with Computer Science and Internet training.

Evaluation Steps: the users were submitted to an evaluation process consisted on the following steps:

First, they were interrogated on their personal aspects and formation. They were asked about their jobs, their environment, their visual affection, and their experience using computers. This was useful for us to get involved with their problematic, to know their concerns, so that a whole conceptual user model could be done.

Second, they assisted to an informative talk, with an estimate duration of 30 minutes, in which they were explained the characteristics and motivations of the portal. This was useful to introduce the portal and to stimulate them to use it on this test.

Third, they were asked to interact with the Web through this portal, assigning to them five tasks or objectives they have to do in a practical way. These activities have different grade of complexity and involve different solution strategies:

Task 1: Read one or more newspapers, and synthesize by own criteria, which was the most outstanding new of each other.

Task 2: Search for information of a subject. These should be general subjects such as education, culture, entertainment, etc.

Task 3: Browse on an specific objective, to see the behavior on the navigation. For example, search for films and upcoming events.

Task 4: Establish any browser topic interesting for the user, similar to the previous one, in which the information changes and where the user have much more context information .

These tasks were given gradually during several sessions, and they had an estimative time of accomplishment. This was useful to observe user's behavior, to register the time and cost of

accomplishment of each task, to analyze the utilization of the assistant and different tools the portal offers. Finally, once they have finish with the practical examination, they had an interview to tell us about their experience with the portal, their reflections, opinions and suggestions. This was useful to know the subjective aspects that help us to determinate the grade of satisfaction they felt with the product.

3. EVALUATION RESULTS

Once the sessions with the portal were finished and the forms were totally completed, the evaluators put them in an exhaustive analysis. Every answer was carefully analyzed and to resume the information obtained with the forms some tables were done. This tables correspond to the form sections that consider the user model, personal evaluation about the portal after the exercise activities and conclusions given by them about the experience they had with the portal. Following, the tables are exposed:

Table about quantity of users according to visual problem and Computer Science knowledge

	Without experience on Computer Science and Web	With experience on Computer Science and Web
Blinded User	6 persons	3 persons
Visually Handicapped User	3 persons	8 persons

According to this table and to the user classification defined in this evaluation, there is a total of 6 persons in group A (blinded people without knowledge of Computer Science and Internet), 3 in group B y C (blinded people with Computer Science and Internet knowledge and visual impaired people without Computer Science experience) and 8 users in group D (visual impaired with Computer Science and Internet knowledge).

Table about quantity of users fulfill the tasks according to the predefined user groups

	Task 1	Task 2	Task 3	Task 4
Group A Based on 6 persons	4 (66,6%)	3 (50%)	1 (16,6%)	3 (50%)
Group B Based on 3 persons	2 (66,6%)	2 (66,6%)	1 (33,3%)	3 (100%)

Group C Based on 3 persons	3 (100%)	2 (66,6%)	2 (66,6%)	3 (100%)
Group D Based on 8 persons	8 (100%)	8 (100%)	6 (75%)	8 (100%)

The results of this table are very interesting, because they determinate the users performance browsing the Web through this portal. Reading it thoroughly, we can make clear the following points:

- Accomplishment ratio was highly satisfactory by users of group A, who are blind and did not have any Computer Science practice before.
- Many cases from group A and C that have an absence of previous knowledge on Computer Science, they have done all tasks but not on the stipulated time. The tasks were considered finally done. This decision was taken in order to be not so rigorous.
- Users of Group C, that have visual problems but they are not blinded, have done a high number of exercises, considering the portal as a very important educative tool.
- There is a general tendency where task 3 had the less grade of accomplishment than the others. This one included a particular subject to search for, that in most of cases, they had problems with the visited page specifically, instead of with the portal.

Table about quantity of users satisfied with the help and keyboard use and their opinion about the portal pros and cons .

	Interactive Speaker Help	Keyboard Use	Pros	Cons
Group A	5 (83,3%)	4 (66,6%)	• Easy Learning. • Guided.	• Delayed assistance help. • Not easy to get accustomed to keys.
Group B	3 (100%)	2 (66,6%)	• Portability. • Very Good context information. • Very Good description of visited pages structure	• Own keyboard use, different other adaptations. • Assistant slowly voice.
Group C	2 (66,6%)	3 (100%)	• Simply to use	• More browser

			• Easy Learning	help needed.
Group D	5 (62,5%)	3 (37,5%)	• Portability • Good context information	• Redundant help, explanations . • Slowly voice. • Much portal interruption. • Different use of the keyboard compared to other adaptations.

This table is also interesting,, for its large quantity of information possible to be extracted to user when is offered an space for opinion, criticism and suggestions. Here, some conclusions are exposed:

- For those users with previous Computer Science and Internet experience, groups B and D, they remark the portability of the site, where there is no need to install PC adaptable products. Also, the context and assistant messages the site shows at every moment, were significant for them.
- Both groups B and D, complain of the key configuration that defers to JAWS product, the one they get familiarized to.
- Group D users have more capacity over the other participants, complaining about the excessive portal help assistance. For them, it was redundant and their suggestion was to configure it.
- Group C users, persons with low vision and less Computer Science knowledge, pointed the tool is very easy to learn and to use, They haven't got previous knowledge about it and they could done almost all of the exercises.
- Group A users, that suffer considerable limitations, blindness and do not have any Web and Computer Science experience, get surprised and pleased for this portal, because they could finally concrete most of the evaluation tasks.

4. CONCLUSIONS

The evaluation results were very satisfactory. Participants, from beginners to advanced, reach the objectives. They have shown very happy because the portal reads to them the pages content

and assist them constantly during their browsing. Advanced users shown great interest for the product, and emphasized the portal advantages, simplicity of use and the benefit of being directly involve to the site without installing the adaptable tools. Apart from this positive reactions, several suggestions were obtained from the interviewees, mostly from visually handicapped people with Computer Science knowledge. For example, they suggested that the guide and help level provided by the system could be able to be configured in order not to be redundant or excessive once the user gets a solid knowledge of the portal. It is evident that a good structure of evaluation let us to obtain interesting metrics about the portal, and if the opinions and suggestions of the interviewees are also considered, the results and feedback exceed all expectations.

The direct contact with visually handicapped and blinded people and having worked together in this process of evaluation, was an unforgettable experience. It is admirable how, despite of having such impediment as vision, that seems to be essential to browse the Web, they adapt quickly the new concepts, they are interested to learn, experiment and to prove. This was a great incentive to culminate the portal development, adjusting technical problems detected on this evaluation and definitively mount it on the Web, to be accessible for everyone.

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